jpm a

CRO-074

TITLE: Fill The SIS Accumulators

PROGRAM APPLICABLE: ___ SOIT ___ SOCT ___ HLT __X__ LOCT _____

ACCEPTABLE EVALUATION METHOD: __X__ PERFORM ___ SIMULATE ___ DISCUSS

EVALUATION LOCATION: __X__ SIMULATOR ___ CONTROL ROOM ___ PLANT

PROJECTED TIME: __20 MIN__ SIMULATOR IC NUMBER: ___IC-211 (Base -188)

ALTERNATE PATH ___ TIME CRITICAL ___ PRA

JPM DIRECTIONS:

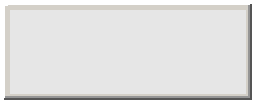
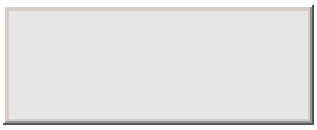
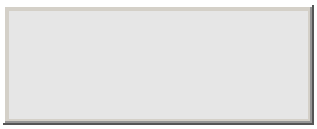
1. Examinee will obtain all references from the simulator.
2. The actions of this task are intended to be performed on an Active Simulator in which the examinee may diagnose the correctness of system response to his/her actions and respond to any abnormal conditions which may arise.
3. Provide student with HANDOUT.
4. Allow student time to review control board.
5. Instructor will be provided to address alarms not related to evaluated task.

TASK STANDARD: Upon successful completion of this JPM, the examinee will:

1. Fill the 1A SIS Accumulator.

Examinee: **Trainee:**	
Overall JPM Performance: **Satisfactory** ☐	**Unsatisfactory** ☐
Evaluator Comments (attach additional sheets if necessary)	

Developer	S Jackson	Date: 4/9/15
NRC Approval	SEE NUREG 1021 FORM ES-301-3	

EVENT DESCRIPTION	ACTION	DETAILS
Reset into IC-211		
Freeze Xe		
Run / Freeze Simulator		
Update Rods	FF5 CLEAR	
Clear Ovation Alarms	OVATION	
Acknowledge computer alarms	SIPC	
Acknowledge Alarms		
Turn Horns ON		
Run / Freeze Simulator		
Un freeze Xe		
Run / Freeze Simulator		

CONDITIONS

When I tell you to begin, you are to **FILL THE SIS ACCUMULATORS**. The conditions under which this task is to be performed are:

a. The Unit is at 100% power.
b. The 1A accumulator level is 40% and pressure is 585 psig due to normal sampling.
c. Chemistry has verified RWST boron concentration is suitable for makeup to the accumulator.
d. You are directed to fill only the 1A accumulator to 45% using FNP-1-SOP-8.0.
e. Continuous communications have been established.
f. The Rad Side SO is standing by with a copy of the procedure and the required locked valve key.

EVALUATION CHECKLIST

		ELEMENTS:	STANDARDS:	RESULTS: (CIRCLE)
		_____ START TIME		
		NOTE: Step 4.1.1.1, Verify RWST boron concentration is suitable for makeup to the accumulator, is satisfied by the initial conditions provided. If requested then provide the cue: Chemistry has verified RWST boron concentration is suitable for makeup to the accumulator.		
1.		4.1.1.2 **Verify** HYDRO TEST PUMP SEAL OVERFLOW ISO, Q1E21V083 (1-CVC-V-8979) OPEN.	SO directed to verify valve open. **(CUE: SO reports V083 is open.)**	S / U
*2.		4.1.1.3 **Open** HYDRO TEST PUMP SUCT, Q1E21V028 (1-CVC-V-8932).	SO directed to open V028. (**CUE: SO reports V028 open.)**	S / U
3.		4.1.1.4 **Verify** HYDRO TEST PUMP DISCH CONT VLV HIK N1E21V313, HIK-947 set to 100% open on the MCB.	Observes HIK-947 Potentiometer fully clockwise, arrow at full right – 100%.	S / U
4.		4.1.1.5 **Verify** ACCUM N2 SUPP ISO, Q1E21HV8880 CLOSED.	Position of HV-8880 is checked. Observes green light lit, red light out**.**	S / U
*5.		4.1.1.6 **Unlock** AND **open** HYDRO TEST PUMP DISCH TO ACCUM, N1E21V085 (1-CVC-V-8967).	SO directed to unlock and open the hydro test pump discharge to accumulator valve V085. **(CUE: SO reports V085 is open.)**	S / U

EVALUATION CHECKLIST

ELEMENTS:		STANDARDS:	RESULTS: (CIRCLE)
*6.	4.1.1.7 **Start** the hydro test pump using local handswitch N1E21HS2100F.	SO directed to start the hydro test pump. **(CUE: SO reports the hydro test pump is started.)**	S / U
*7.	4.1.1.8.1 **Open** ACCUM FILL LINE ISO Q1E21HV8860 (Q1E21V091).	HS for HV-8860 taken to open position. Observes red light lit, green light out.	S / U
*8	4.1.1.8.2 **Open** 1A ACCUM FILL LINE ISO Q1E21HV8878A (Q1E21V034A).	HS for HV-8878A taken to open position. Observes red light lit, green light out.	S / U
*9.	4.1.1.9 **Adjust** HYDRO TEST PUMP DISCH CONT VLV HIK 947 to maintain 665 psig on the local pressure indicator N1E21PI0947.	HIK-947 is turned counterclockwise until SO reports that pressure is greater than Accumulator pressure.	S / U
10.	4.1.1.10 **Monitor** accumulator water level indicators LI-920, 922, 924, 926, 928, and 930, AND **verify** that only the desired accumulator shows an increase while filling.	Accumulator levels are monitored. Observes 1A Accumulator level rising.	S / U
11.	4.1.1.11 **Monitor** accumulator pressure indicators PI-921, 923,925, 927, 929, and 931 AND **verify** that only the desired accumulator shows a pressure increase while filling.	Monitor accumulator pressures. Pressure should remain < 640 psig. Observes pressure rising.	S / U

EVALUATION CHECKLIST

ELEMENTS:		STANDARDS:	RESULTS: (CIRCLE)
When Accumulator level reaches 45% then:			
*12.	4.1.1.12.1 **Adjust** HYDRO TEST PUMP DISCH CONT VLV full open using HIK 947.	HIK-947 taken fully clockwise. Observes HIK-947 Potentiometer fully clockwise, arrow at full right – 100%.	S / U
*13.	4.1.1.12.2 **Close** 1A ACCUM FILL LINE ISO Q1E21HV8878A (Q1E21V034A).	Handswitch for HV-8878A taken to close position. Observes green light lit, red light out.	S / U
NOTE: Step 4.1.1.13 is N/A			
*14.	4.1.1.14.1 **Close** ACCUM FILL LINE ISO Q1E21HV8860 Q1E21V091).	Handswitch for HV-8860 taken to close position. Observes green light lit, red light out.	S / U
*15.	4.1.1.14.2 Stop the hydro test pump.	SO directed to stop the hydro test pump. **(CUE: SO reports hydro test pump is stopped.)**	S / U
16.	4.1.1.15 **Close** ACCUM N2 VENT HIK 936 (Q1G21V092).	ACCUM N_2 VT HIK 936 (QV092) checked closed. Observes potentiometer fully counterclockwise – arrow at 0%.	S / U
17.	4.1.1.16 **Verify** HYDRO TEST PMP DISCH CONT VLV N1E21V313 fully open by adjusting HIK 947 on MCB to 100% demand.	Observes HIK-947 Potentiometer fully clockwise, arrow at full right – 100.	S / U
*18.	4.1.1.17 **Close** AND **lock** HYDRO TEST PUMP DISCH TO ACCUM, N1E21V085 (1-CVC-V-8967).	SO directed to close and lock V085. **(CUE: SO reports that V085 is locked closed.)**	S / U

EVALUATION CHECKLIST

ELEMENTS:	STANDARDS:	RESULTS: (CIRCLE)
*19. 4.1.1.18 **Close** HYDRO TEST PUMP SUCT, Q1E21V028 (1-CVC-V-8932).	SO directed to close V028. **(CUE: SO reports that V028 is closed.)**	S / U

____ STOP TIME

Terminate when Q1E21V028 is closed

CRITICAL ELEMENTS: Critical Elements are denoted with an asterisk (*) preceding the element number.

GENERAL REFERENCES

1. FNP-1-SOP-8.0, Version 43.0
2. K/A: 006A1.13 – 3.5 / 3.7
   006A4.02 – 4.0 / 3.8

GENERAL TOOLS AND EQUIPMENT

None

Critical ELEMENT justification:

1	Not Critical – Does not prevent filling the Accumulator.
2	Critical – Task completion. Required for system line up.
3-4	Not Critical – No actions taken by applicant. Check steps
5	Critical – Task completion. Required for system line up.
6	Critical – Task completion. Provides motive force for water to fill the accumulator
7, 8	Critical – Task completion. Required for system line up.
9	Critical – Task completion. Required for adequate pressure.
10, 11	Not Critical – No actions taken by applicant.
12	Critical – Task completion. Prevents overfilling Accumulator
13-15	Critical – Task completion. Proper system restoration.
16	Not Critical – No action taken by applicant.
18, 19	Critical – Task completion. Proper system restoration.

COMMENTS

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CONDITIONS

When I tell you to begin, you are to **FILL THE SIS ACCUMULATORS**. The conditions under which this task is to be performed are:

a. The Unit is at 100% power.
b. The 1A accumulator level is 40% and pressure is 585 psig due to normal sampling.
c. Chemistry has verified RWST boron concentration is suitable for makeup to the accumulator.
d. You are directed to fill only the "1A" accumulator to 45% using FNP-1-SOP-8.0.
e. Continuous communications have been established.
f. The Rad Side SO is standing by with a copy of the procedure and the required locked valve key.

SAFETY RELATED

SAFETY INJECTION SYSTEM - ACCUMULATORS

PROCEDURE LEVEL OF USE CLASSIFICATION PER NMP-AP-003	
CATEGORY	**SECTIONS**
Continuous:	**ALL**
Reference:	**NONE**
Information:	**NONE**

Approved:

David L Reed
Operations

04/10/2015
Effective Date

Procedure Version Description

Version Number	Version Description
41.0	Updated procedure to requirements of NMP-OS-008-001, Operations Procedure Writing Instructions. Also revised mythology to fill and pressurize accumulators.
42.0	Corrected sequence of applied cautions before steps 4.1.1.9 and 4.1.1.11. CR 353194
43.0	DCP SNC540544 - Revised per mark-up provided.

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1.0 Purpose

This procedure provides the Initial Conditions, Precautions, Limitations, and Instructions for the operation of the Safety Injection System-Accumulators.

2.0 Initial Conditions

2.1 The Electrical Distribution System is energized and aligned for normal operation per FNP-1-SOP-36.0, Plant Electrical Distribution Line-Up, with exceptions noted.

2.2 The accumulator valves and electrical distribution system are aligned per System Check List FNP-1-SOP-8.0A, Safety Injection System - Accumulators, with exceptions noted.

2.3 The refueling water storage tank contains primary grade water borated to greater than 2300 ppm.

2.4 The Nitrogen System is in service and aligned for normal operation per FNP-0-SOP-33.0, Nitrogen System.

3.0 Precautions and Limitations

3.1 Accumulator pressure should be maintained between 605 and 645 psig in Modes 1, 2, and 3. Do not exceed the accumulator design pressure of 700 psig.

3.2 Do not allow accumulator level to exceed a high level of 55% or a low level of 35% in Modes 1, 2, and 3.

3.3 Alert personnel in containment prior to venting accumulators.

3.4 1A, B, and C ACCUM DISCH ISO Q1E21MOV8808A, B, and C (Q1E21V038A, B, and C) should be closed when RCS pressure is less than 1000 psig and open when RCS pressure is greater than 1000 psig.

3.5 The temperature of the accumulators must be kept above 70°F (the minimum temperature for pressurization) whenever the accumulators are pressurized.

3.6 If any accumulator level rises significantly (approx. 5%) due to in-leakage from RCS, then sample the accumulator to verify boron concentration > 2300 ppm.

3.7 Cross-connection of accumulators via N2 or Fill lines is prohibited in Modes 1, 2, or 3 (with RCS pressure greater than 1000 psig). This is because in the event of a LOCA, all cross-connected accumulators would depressurize through the faulted RCS loop.

3.8 If increasing accumulator nitrogen pressure per Section 4.5 after establishing nitrogen atmosphere per section 4.4, then ensure the high pressure nitrogen banks are greater than 1000 psig prior to performing Section 4.5.

3.9 Guidance in this procedure has the potential to impact reactivity. Close coordination with the control room operators is required to ensure proper reactivity management per NMP-OS-001, Reactivity Management Program. (AI 2008203128)

NOTES

- Accumulator levels must be maintained between 35% and 55% while in operational modes 1, 2, and 3 (with RCS pressure greater than 1000 psig).
- The accumulator boron concentration must be maintained between 2200 and 2500 ppm while in operational modes 1, 2, and 3 (with RCS pressure greater than 1000 psig).
- The hydro test pump is a positive displacement pump, therefore a flowpath must be maintained at all times with pump running; so HIK-947 must remain open while pump is running to prevent lifting the relief valve. (CR 2008108980)

CAUTION

Cross-connection of accumulators via N2 or Fill lines is Prohibited in Modes 1, 2, or 3 (with RCS pressure greater than 1000 psig).

4.0 Instructions

4.1 Filling Accumulators at power

4.1.1 Filling Accumulator 1A:

4.1.1.1 **Verify** RWST boron concentration is suitable for makeup to the accumulator. ☐

4.1.1.2 **Verify** HYDRO TEST PUMP SEAL OVERFLOW ISO, Q1E21V083 (1-CVC-V-8979) OPEN. ☐

4.1.1.3 **Open** HYDRO TEST PUMP SUCT, Q1E21V028 (1-CVC-V-8932). ☐

4.1.1.4 **Verify** HYDRO TEST PUMP DISCH CONT VLV HIK N1E21V313, HIK-947 set to 100% open on the MCB. ☐

4.1.1.5 **Verify** ACCUM N2 SUPP ISO, Q1E21HV8880 CLOSED. ☐

4.1.1.6 **Unlock** AND **open** HYDRO TEST PUMP DISCH TO ACCUM, N1E21V085 (1-CVC-V-8967). ☐

4.1.1.7 **Start** the hydro test pump using local handswitch N1E21HS2100F. ☐

4.1.1.8 **Perform** the following:

4.1.1.8.1 **Open** ACCUM FILL LINE ISO Q1E21HV8860 (Q1E21V091). ☐

4.1.1.8.2 **Open** 1A ACCUM FILL LINE ISO Q1E21HV8878A (Q1E21V034A). ☐

CAUTION

Adjust pressure in the following step gradually, reading pressure locally at hydro test pump on N1E21PI0947, while in contact with the Control Room (two people may be required locally to maintain communication). (CR 2008108980)

4.1.1.9 **Adjust** HYDRO TEST PUMP DISCH CONT VLV HIK 947 to maintain 665 psig on the local pressure indicator N1E21PI0947. ☐

4.1.1.10 **Monitor** accumulator water level indicators LI-920, 922, 924, 926, 928, and 930, AND **verify** that only the desired accumulator shows an increase while filling. ☐

NOTE

IF accumulator pressure increases to greater than 640 psig, THEN the hydro test pump must be stopped AND the accumulator vented.

CAUTION

Ensure accumulator pressure does not exceed 645 psig during filling, which is the setpoint for accumulator high pressure alarm.

4.1.1.11 **Monitor** accumulator pressure indicators PI-921, 923, 925, 927, 929, and 931 AND **verify** that only the desired accumulator shows a pressure increase while filling. ☐

4.1.1.12 WHEN the accumulator is filled to desired level, THEN **perform** the following:

4.1.1.12.1 **Adjust** HYDRO TEST PUMP DISCH CONT VLV full open using HIK 947. ☐

4.1.1.12.2 **Close** 1A ACCUM FILL LINE ISO Q1E21HV8878A (Q1E21V034A). ☐

4.1.1.13 IF additional accumulators are required to be filled, THEN **proceed** to Sections 4.1.2 OR 4.1.3. ☐

4.1.1.14 IF no additional accumulators require filling, THEN **perform** the following:

4.1.1.14.1 **Close** ACCUM FILL LINE ISO Q1E21HV8860 (Q1E21V091). ☐

4.1.1.14.2 **Stop** the hydro test pump. ☐

4.1.1.15 **Close** ACCUM N2 VENT HIK 936 (Q1G21V092). ☐

4.1.1.16 **Verify** HYDRO TEST PMP DISCH CONT VLV N1E21V313 fully open by adjusting HIK 947 on MCB to 100% demand. ☐

4.1.1.17 **Close** AND **lock** HYDRO TEST PUMP DISCH TO ACCUM, N1E21V085 (1-CVC-V-8967). ☐

4.1.1.18 **Close** HYDRO TEST PUMP SUCT, Q1E21V028 (1-CVC-V-8932). ☐

NOTE

In the following step, sampling is not required if the make up source was the RWST.

4.1.1.19 IF any accumulator level was increased more than 12% on the level indicator, THEN **verify** the boron concentration within 6 hours.

4.1.2 Filling Accumulator 1B:

4.1.2.1 **Verify** RWST boron concentration is suitable for makeup to the accumulator. ☐

4.1.2.2 **Verify** HYDRO TEST PUMP SEAL OVERFLOW ISO, Q1E21V083 (1-CVC-V-8979) OPEN. ☐

4.1.2.3 **Open** HYDRO TEST PUMP SUCT, Q1E21V028 (1-CVC-V-8932). ☐

4.1.2.4 **Verify** HYDRO TEST PUMP DISCH CONT VLV HIK N1E21V313, HIK-947 set to 100% open on the MCB. ☐

4.1.2.5 **Verify** ACCUM N2 SUPP ISO, Q1E21HV8880 CLOSED. ☐

4.1.2.6 **Unlock** AND **open** HYDRO TEST PUMP DISCH TO ACCUM, N1E21V085 (1-CVC-V-8967). ☐

4.1.2.7 **Start** the hydro test pump using local handswitch N1E21HS2100F. ☐

4.1.2.8 **Perform** the following:

4.1.2.8.1 **Open** ACCUM FILL LINE ISO Q1E21HV8860 (Q1E21V091). ☐

4.1.2.8.2 **Open** 1B ACCUM FILL LINE ISO Q1E21HV8878B (Q1E21V034B). ☐

4.1.2.9 **Adjust** HYDRO TEST PUMP DISCH CONT VLV HIK 947 to maintain 665 psig on the local pressure indicator N1E21PI0947. ☐

CAUTION

Adjust pressure in the following step gradually, reading pressure locally at hydro test pump on N1E21PI0947, while in contact with the Control Room (two people may be required locally to maintain communication). (CR 2008108980)

4.1.2.10 **Monitor** accumulator water level indicators LI-920, 922, 924, 926, 928, and 930, to verify that only the desired accumulator shows an increase while filling. ☐

NOTE

If accumulator pressure increases to greater than 640 psig, then the hydro test pump must be stopped and the accumulator vented.

4.1.2.11 **Monitor** accumulator pressure indicators PI-921, 923, 925, 927, 929, and 931 AND **verify** that only the desired accumulator shows a pressure increase while filling. ☐

CAUTION

Ensure accumulator pressure does not exceed 645 psig during filling, which is the setpoint for accumulator high pressure alarm.

4.1.2.12 WHEN the accumulator is filled to desired level, THEN **perform** the following:

4.1.2.12.1 **Adjust** HYDRO TEST PUMP DISCH CONT VLV full open using HIK 947. ☐

4.1.2.12.2 **Close** 1B ACCUM FILL LINE ISO Q1E21HV8878B (Q1E21V034B). ☐

4.1.2.13 IF additional accumulators are required to be filled, THEN **proceed** to Sections 4.1.1 or 4.1.3. ☐

4.1.2.14 IF no additional accumulators require filling, THEN **perform** the following:

4.1.2.14.1 **Close** ACCUM FILL LINE ISO Q1E21HV8860 (Q1E21V091). ☐

4.1.2.14.2 **Stop** the hydro test pump. ☐

4.1.2.15 **Close** ACCUM N2 VENT HIK 936 (Q1G21V092). ☐

4.1.2.16 **Verify** HYDRO TEST PMP DISCH CONT VLV N1E21V313 fully open by adjusting HIK 947 on MCB to 100% demand. ☐

4.1.2.17 **Close** AND **lock** HYDRO TEST PUMP DISCH TO ACCUM, N1E21V085 (1-CVC-V-8967). ☐

4.1.2.18 **Close** HYDRO TEST PUMP SUCT, Q1E21V028 (1-CVC-V-8932). ☐

NOTE

In the following step, sampling is not required if the make-up source was the RWST.

4.1.2.19 IF any accumulator level was increased more than 12% on the level indicator, THEN **verify** the boron concentration within 6 hours. ☐

4.1.3 Filling Accumulator 1C:

4.1.3.1 **Verify** RWST boron concentration is suitable for makeup to the accumulator. ☐

4.1.3.2 **Verify** HYDRO TEST PUMP SEAL OVERFLOW ISO, Q1E21V083 (1-CVC-V-8979) OPEN. ☐

4.1.3.3 **Open** HYDRO TEST PUMP SUCT, Q1E21V028 (1-CVC-V-8932). ☐

4.1.3.4 **Verify** HYDRO TEST PUMP DISCH CONT VLV HIK N1E21V313, HIK-947 set to 100% open on the MCB. ☐

4.1.3.5 **Verify** ACCUM N2 SUPP ISO, Q1E21HV8880 CLOSED. ☐

4.1.3.6 **Unlock** AND **open** HYDRO TEST PUMP DISCH TO ACCUM, N1E21V085 (1-CVC-V-8967). ☐

4.1.3.7 **Start** the hydro test pump using local handswitch N1E21HS2100F. ☐

4.1.3.8 **Perform** the following:

4.1.3.8.1 **Open** ACCUM FILL LINE ISO Q1E21HV8860 (Q1E21V091). ☐

4.1.3.8.2 **Open** 1C ACCUM FILL LINE ISO Q1E21HV8878C (Q1E21V034C). ☐

4.1.3.9 **Adjust** HYDRO TEST PUMP DISCH CONT VLV HIK 947 to maintain 665 psig on local pressure indicator N1E21PI0947. ☐

CAUTION

Adjust pressure in the following step gradually, reading pressure locally at hydro test pump on N1E21PI0947, while in contact with the Control Room (two people may be required locally to maintain communication). (CR 2008108980)

4.1.3.10 **Monitor** accumulator water level indicators LI-920, 922, 924, 926, 928, and 930, AND **verify** that only the desired accumulator shows an increase while filling. ☐

NOTE

If accumulator pressure increases to greater than 640 psig, the hydro test pump must be stopped and the accumulator vented.

4.1.3.11 **Monitor** accumulator pressure indicators PI-921, 923, 925, 927, 929, and 931 AND **verify** that only the desired accumulator shows a pressure increase while filling. ☐

CAUTION

Ensure accumulator pressure does not exceed 645 psig during filling, which is the setpoint for accumulator high pressure alarm.

4.1.3.12 WHEN the accumulator is filled to desired level, THEN **perform** the following: ☐

4.1.3.12.1 **Adjust** HYDRO TEST PUMP DISCH CONT VLV full open using HIK 947. ☐

4.1.3.12.2 **Close** 1C ACCUM FILL LINE ISO Q1E21HV8878C (Q1E21V034C). ☐

4.1.3.13 IF additional accumulators are required to be filled, THEN **return** to Sections 4.1.1 or 4.1.2. ☐

4.1.3.14 IF no additional accumulators require filling, THEN **perform** the following:

4.1.3.14.1 **Close** ACCUM FILL LINE ISO Q1E21HV8860 (Q1E21V091). ☐

4.1.3.14.2 **Stop** the hydro test pump. ☐

4.1.3.15 **Close** ACCUM N2 VENT HIK 936(Q1G21V092). ☐

4.1.3.16 **Verify** HYDRO TEST PMP DISCH CONT VLV N1E21V313 fully open by adjusting HIK 947 on MCB to 100% demand. ☐

4.1.3.17 **Close** AND **lock** HYDRO TEST PUMP DISCH TO ACCUM, N1E21V085 (1-CVC-V-8967). ☐

4.1.3.18 **Close** HYDRO TEST PUMP SUCT, Q1E21V028 (1-CVC-V-8932). ☐

NOTE

In the following step, sampling is not required if the make up source was the RWST.

4.1.3.19 IF any accumulator level was increased more than 12% on the level indicator, THEN **verify** the boron concentration within 6 hours. ☐

CAUTIONS

Accumulator levels must be maintained between 35% and 55% while in operational modes 1, 2, and 3 (with RCS pressure greater than 1000 psig).

Cross-connection of accumulators via N2 or Fill lines is Prohibited in Modes 1, 2 or 3 (with RCS pressure greater than 1000 psig).

4.2 Draining Accumulators:

4.2.1 Draining 1A Accumulator with RCS Pressure Greater Than 1000 psig:

4.2.1.1 **Open** the following valves:

- ACCUM TEST LINE TO RWST ISO, Q1E21HV8961. ☐
- ACCUM TEST LINE TO RWST ISO, Q1E21HV8871. ☐

4.2.1.2 **Open** 1A ACCUM TEST LINE ISO, Q1E21HV8877A to commence draining accumulator. ☐

4.2.1.3 **Monitor** accumulator level indicators AND **verify** the water level in accumulator 1A is the only accumulator which shows a decrease in level. ☐

4.2.1.4 **Monitor** accumulator pressure while draining. ☐

NOTE

If pressure decreases to less than 610 psig, then draining must be secured AND accumulator pressurized.

4.2.1.5 WHEN the accumulator is drained to the desired level, THEN **close** the following valves:

- 1A ACCUM TEST LINE ISO, Q1E21HV8877A. ☐
- ACCUM TEST LINE TO RWST ISO, Q1E21HV8961. ☐
- ACCUM TEST LINE TO RWST ISO, Q1E21HV8871. ☐

4.2.2 Draining 1B Accumulator with RCS Pressure Greater Than 1000 psig:

4.2.2.1 **Open** the following valves:

- ACCUM TEST LINE TO RWST ISO, Q1E21HV8961. ☐
- ACCUM TEST LINE TO RWST ISO, Q1E21HV8871. ☐

4.2.2.2 **Open** 1B ACCUM TEST LINE ISO, Q1E21HV8877B to commence draining accumulator. ☐

4.2.2.3 **Monitor** accumulator level indicators AND **verify** the water level in accumulator 1B is the only accumulator which shows a decrease in level. ☐

4.2.2.4 **Monitor** accumulator pressure while draining. ☐

NOTE

If pressure decreases to less than 610 psig, then draining must be secured and accumulator pressurized.

4.2.2.5 WHEN the accumulator is drained to the desired level, THEN **close** the following valves:

- 1B ACCUM TEST LINE ISO, Q1E21HV8877B. ☐
- ACCUM TEST LINE TO RWST ISO, Q1E21HV8961. ☐
- ACCUM TEST LINE TO RWST ISO, Q1E21HV8871. ☐

4.2.3 Draining 1C Accumulator with RCS Pressure Greater Than 1000 psig

4.2.3.1 **Open** the following valves:

- ACCUM TEST LINE TO RWST ISO, Q1E21HV8961. ☐
- ACCUM TEST LINE TO RWST ISO, Q1E21HV8871. ☐

4.2.3.2 **Open** 1C ACCUM TEST LINE ISO, Q1E21HV8877C to commence draining accumulator. ☐

4.2.3.3 **Monitor** accumulator level indicators AND **verify** the water level in accumulator 1C is the only accumulator which shows a decrease in level. ☐

4.2.3.4 **Monitor** accumulator pressure while draining. ☐

NOTE

If pressure decreases to less than 610 psig, then draining must be secured and accumulator pressurized.

4.2.3.5 WHEN the accumulator is drained to the desired level, THEN **close** the following valves:

- 1C ACCUM TEST LINE ISO, Q1E21HV8877C. ☐
- ACCUM TEST LINE TO RWST ISO, Q1E21HV8961. ☐
- ACCUM TEST LINE TO RWST ISO, Q1E21HV8871. ☐

NOTE

Draining may be done using section 4.7, Pumping accumulators to RWST with RCS Pressure Less Than 1000 psig.

If only a small level decrease is required, the accumulator may be drained via the sample system by Chemistry personnel per FNP-1-CCP-660 Sampling The Accumulators.

4.3 Draining Accumulators with RCS Pressure Less Than 1000 psig

4.3.1 Draining 1A Accumulator.

4.3.1.1 **Coordinate** with OCC or CTMT Coordinator to determine the most appropriate time to start venting 1B ACCUM. ☐

4.3.1.2 **Verify** the RCDT system is aligned for normal operation (not cavity drain) per FNP-1-SOP-50.0, Liquid Waste Processing System. (AI 2003201775) ☐

4.3.1.3 **Verify** 1A ACCUM DISCH ISO, Q1E21MOV8808A is CLOSED. ☐

4.3.1.4 **Open** 1A ACCUM N2 SUPP/VT ISO, Q1E21HV8875A. ☐

4.3.1.5 **Alert** personnel in containment that nitrogen will be vented from the accumulators into the containment atmosphere. ☐

4.3.1.6 SLOWLY **open** ACCUM N2 VENT HIK 936 (Q1G21V092). ☐

4.3.1.7 **Monitor** accumulator pressure during venting operation. ☐

4.3.1.8 WHEN accumulator pressure has decreased to approximately 15 psig, THEN **close** the following valves:

- ACCUM N2 VENT HIK 936 (Q1G21V092). ☐
- ACCUM N2 SUPP/VT ISO Q1E21HV8875A. ☐

4.3.1.9 **Verify** the following valves CLOSED:

- 1A ACCUM DRAIN TO RCDT, Q1E21V041A (1-CVC-V-8955A). ☐
- SIS 1A ACCUM DRN, Q1G21V255A (1-LWP-V-7130A). ☐

4.3.1.10 **Notify** Maintenance to install spool piece in accumulator 1A drain line to RCDT pump suction. ☐

4.3.1.11 WHEN spool piece is installed THEN, **Open** 1A ACCUM DRAIN TO RCDT, Q1E21V041A (1-CVC-V-8955A). ☐

4.3.1.12 **Stop** or **verify** stopped the following RCDT pumps:

- RCDT pump 1A. ☐
- RCDT pump 1B. ☐

4.3.1.13 **Close** the following valves:

- RCDT OUTLET ISO, N1G21HV7127. ☐
- RCDT RECIRC ISO, N1G21HV7144. ☐

NOTE

When the following lineup is complete, the source and receipt tanks should be frequently monitored for level changes. Due to the different elevations and system pressures, fluid may transfer with or without RCDT Pump operation. (CR2010106296)

4.3.1.14 **Open** the following valves:

- SIS 1A ACCUM DRN, Q1G21V255A (1-LWP-V-7130A). ☐
- RCDT LCV, Q1G21LCV1003. ☐
- RCDT PUMP DISCH TO RHT ISO, Q1E21V315 (1-CVC-V-8551). (Located in 121' PPR) ☐

4.3.1.15 **Start** one of the following RCDT pumps:

- RCDT pump 1A. ☐
- RCDT pump 1B. ☐

NOTE

If the RCDT pump discharge flow decreases to less than 85 gpm, then the operating RCDT pump will automatically stop.

4.3.1.16 WHEN desired accumulator level is reached, THEN **perform** the following:

4.3.1.16.1 **Stop** the RCDT pump started in Step 4.3.1.15. ☐

4.3.1.16.2 **Close** RCDT LCV Q1G21LCV1003 (Q1G21V064). ☐

4.3.1.17 **Close** the following valves:

- SIS 1A ACCUM DRN, Q1G21V255A (1-LWP-V-7130A). ☐
- 1A ACCUM DRAIN TO RCDT, Q1E21V041A (1-CVC-V-8955A). ☐

4.3.1.18 **Open** the following valves:

- RCDT OUTLET ISO, N1G21HV7127. ☐
- RCDT RECIRC ISO, N1G21HV7144. ☐

4.3.1.19 **Restore** the RCDT system to normal operation per FNP-1-SOP-50.0, Liquid Waste Processing System. ☐

4.3.1.20 **Notify** Maintenance to remove spool piece from accumulator 1A drain line to RCDT pump suction. ☐

4.3.2 Draining 1B Accumulator.

4.3.2.1 **Coordinate** with OCC or CTMT Coordinator to determine the most appropriate time to start venting 1C ACCUM. ☐

4.3.2.2 **Verify** the RCDT system is aligned for normal operation (not cavity drain) per FNP-1-SOP-50.0, Liquid Waste Processing System. (AI 2003201775) ☐

4.3.2.3 **Verify** 1B ACCUM DISCH ISO, Q1E21MOV8808B is CLOSED. ☐

4.3.2.4 **Open** 1B ACCUM N2 SUPP/VT ISO, Q1E21HV8875B. ☐

4.3.2.5 **Alert** personnel in containment that nitrogen will be vented from the accumulators into the containment atmosphere. ☐

4.3.2.6 SLOWLY **open** ACCUM N2 VENT HIK 936 (Q1G21V092). ☐

4.3.2.7 **Monitor** accumulator pressure during venting operation. ☐

4.3.2.8 WHEN accumulator pressure has decreased to approximately 15 psig, THEN **close** the following valves:

- ACCUM N2 VENT HIK 936(Q1G21V092). ☐
- 1B ACCUM N2 SUPP/VT ISO Q1E21HV8875B. ☐

4.3.2.9 **Verify** the following valves CLOSED:

- 1B ACCUM DRAIN TO RCDT, Q1E21V041B (1-CVC-V-8955B). ☐
- SIS 1B ACCUM DRN, Q1G21V255B (1-LWP-V-7130B). ☐

4.3.2.10 **Notify** Maintenance to install spool piece in accumulator 1B drain line to RCDT pump suction. ☐

4.3.2.11 WHEN spool piece is installed, THEN **Open** 1B ACCUM DRAIN TO RCDT, Q1E21V041B (1-CVC-V-8955B). ☐

4.3.2.12 **Stop** or **verify** stopped the following RCDT pumps**:**

- RCDT pump 1A. ☐
- RCDT pump 1B. ☐

4.3.2.13 **Close** the following valves:

- RCDT OUTLET ISO, N1G21HV7127. ☐
- RCDT RECIRC ISO, N1G21HV7144. ☐

NOTE

When the following line up is complete, the source and receipt tanks should be frequently monitored for level changes. Due to the different elevations and system pressures, fluid may transfer with or without RCDT Pump operation. (CR2010106296)

4.3.2.14 **Open** the following valves:

- SIS 1B ACCUM DRN, Q1G21V255B (1-LWP-V-7130B). ☐
- RCDT LCV, Q1G21LCV1003. ☐
- RCDT PUMP DISCH TO RHT ISO, Q1E21V315 (1-CVC-V-8551). (Located in 121' PPR) ☐

4.3.2.15 **Start** one of the following RCDT pumps:

- RCDT pump 1A. ☐
- RCDT pump 1B. ☐

NOTE

If the RCDT pump discharge flow decreases to less than 85 gpm, the operating RCDT pump will automatically stop.

4.3.2.16 WHEN desired accumulator level is reached, THEN **perform** the following:

4.3.2.16.1 **Stop** the RCDT pump started in Step 4.3.2.15. ☐

4.3.2.16.2 **Close** RCDT LCV Q1G21LCV1003 (Q1G21V064). ☐

4.3.2.17 **Close** the following valves:

- SIS 1B ACCUM DRN, Q1G21V255B (1-LWP-V-7130B). ☐
- 1B ACCUM DRAIN TO RCDT, Q1E21V041B (1-CVC-V-8955B). ☐

4.3.2.18 **Open** the following valves:

- RCDT OUTLET ISO, N1G21HV7127. ☐
- RCDT RECIRC ISO, N1G21HV7144. ☐

4.3.2.19 **Restore** the RCDT system to normal operation per FNP-1-SOP-50.0, Liquid Waste Processing System. ☐

4.3.2.20 **Notify** Maintenance to remove spool piece from accumulator 1B drain line to RCDT pump suction. ☐

4.3.3 Draining 1C Accumulator:

4.3.3.1 **Coordinate** with OCC or CTMT Coordinator to determine the most appropriate time to start venting 1A ACCUM. ☐

4.3.3.2 **Verify** that the RCDT system is aligned for normal operation (not cavity drain) per FNP-1-SOP-50.0, Liquid Waste Processing System. (AI 2003201775) ☐

4.3.3.3 **Verify** 1C ACCUM DISCH ISO, Q1E21MOV8808C is CLOSED. ☐

4.3.3.4 **Open** 1C ACCUM N2 SUPP/VT ISO, Q1E21HV8875C. ☐

4.3.3.5 Prior to venting, **alert** personnel in containment that nitrogen will be vented from the accumulators into the containment atmosphere. ☐

4.3.3.6 SLOWLY **open** ACCUM N2 VENT HIK 936 (Q1G21V092). ☐

4.3.3.7 **Monitor** accumulator pressure during venting operation. ☐

4.3.3.8 WHEN accumulator pressure has decreased to approximately 15 psig, THEN **close** the following valves:

- ACCUM N2 VENT HIK 936(Q1G21V092). ☐
- 1C ACCUM N2 SUPP/VT ISO Q1E21HV8875C. ☐

4.3.3.9 **Verify** the following valves CLOSED:

- 1C ACCUM DRAIN TO RCDT, Q1E21V041C (1-CVC-V-8955C). ☐
- SIS 1C ACCUM DRN, Q1G21V255C (1-LWP-V-7130C). ☐

4.3.3.10 **Notify** Maintenance to install spool piece in accumulator 1C drain line to RCDT pump suction. ☐

4.3.3.11 WHEN spool piece is installed, THEN **Open** 1C ACCUM DRAIN TO RCDT, Q1E21V041C (1-CVC-V-8955C). ☐

4.3.3.12 **Stop** or **verify stopped** the following RCDT pumps:

- RCDT pump 1A. ☐
- RCDT pump 1B. ☐

4.3.3.13 **Close** the following valves:

- RCDT OUTLET ISO, N1G21HV7127. ☐
- RCDT RECIRC ISO, N1G21HV7144. ☐

NOTE

WHEN the following line-up is complete, the source and receipt tanks should be frequently monitored for level changes. Due to the different elevations and system pressures, fluid may transfer with or without RCDT Pump operation. (CR2010106296)

4.3.3.14 **Open** the following valves:

- SIS 1C ACCUM DRN, Q1G21V255C (1-LWP-V-7130C). ☐
- RCDT LCV, Q1G21LCV1003. ☐
- RCDT PUMP DISCH TO RHT ISO, Q1E21V315 (1-CVC-V-8551). (Located in 121' PPR) ☐

4.3.3.15 **Start** one of the following RCDT pumps:

- RCDT pump 1A. ☐
- RCDT pump 1B. ☐

NOTE

If the RCDT pump discharge flow decreases to less than 85 gpm, the operating RCDT pump will automatically stop.

4.3.3.16 WHEN desired accumulator level is reached, THEN **perform** the following:

4.3.3.16.1 **Stop** the RCDT pump started in Step 4.3.3.15. ☐

4.3.3.16.2 **Close** RCDT LCV Q1G21LCV1003 (Q1G21V064). ☐

4.3.3.17 **Close** the following valves:

- SIS C ACCUM DRN, Q1G21V255C (1-LWP-V-7130C). ☐
- 1C ACCUM DRAIN TO RCDT, Q1E21V041C (1-CVC-V-8955C). ☐

4.3.3.18 **Open** the following valves:

- RCDT OUTLET ISO, N1G21HV7127. ☐
- RCDT RECIRC ISO, N1G21HV7144. ☐

4.3.3.19 **Restore** the RCDT system to normal operation per FNP-1-SOP-50.0, Liquid Waste Processing System. ☐

4.3.3.20 **Notify** Maintenance to remove spool piece from accumulator 1C drain line to RCDT pump suction. ☐

4.4 Establishing a Nitrogen Atmosphere in the Accumulators:

4.4.1 Establishing a Nitrogen Atmosphere in Accumulator 1A

4.4.1.1 IF required, THEN **vent** accumulator 1A to zero psig per Section 4.8. ☐

4.4.1.2 **Open** the following valves:

- 1A ACCUM N2 SUPP/VT ISO, Q1E21HV8875A. ☐
- ACCUM N2 VENT HIK-936. ☐

4.4.1.3 **Fill** accumulator 1A per the following steps:

4.4.1.3.1 **Verify** RWST boron concentration is suitable for makeup to the accumulator. ☐

4.4.1.3.2 **Verify** HYDRO TEST PUMP SEAL OVERFLOW ISO, Q1E21V083 (1-CVC-V-8979) OPEN. ☐

4.4.1.3.3 **Open** HYDRO TEST PUMP SUCT, Q1E21V028 (1-CVC-V-8932). ☐

4.4.1.3.4 **Verify** HYDRO TEST PUMP DISCH CONT VLV HIK N1E21V313, HIK-947 set to 100% open on the MCB. ☐

4.4.1.3.5 **Verify** ACCUM N2 SUPP ISO, Q1E21HV8880 CLOSED. ☐

4.4.1.3.6 **Unlock** AND **open** HYDRO TEST PUMP DISCH TO ACCUM, N1E21V085 (1-CVC-V-8967). ☐

4.4.1.3.7 **Start** the hydro test pump using local handswitch N1E21HS2100F. ☐

4.4.1.3.8 **Open** ACCUM FILL LINE ISO, Q1E21HV8860. ☐

4.4.1.3.9 **Open** 1A ACCUM FILL LINE ISO, Q1E21HV8878A. ☐

CAUTION

Pressure should be adjusted gradually, reading pressure locally at hydro test pump on N1E21PI0947, while in contact with the Control Room (two people may be required locally to maintain communication). (CR 2008108980)

4.4.1.3.10 **Adjust** HYDRO TEST PUMP DISCH CONT VLV HIK 947 to maintain 665 psig on the local pressure indicator N1E21PI0947. ☐

4.4.1.3.11 **Monitor** accumulator water level indicators LI-920, 922, 924, 926, 928, and 930, AND **verify** only the desired accumulator shows an increase while filling. ☐

NOTE

If accumulator pressure increases to greater than 640 psig, the hydro test pump must be stopped and the accumulator vented.

4.4.1.3.12 **Monitor** accumulator pressure indicators PI-921, 923, 925, 927, 929, and 931 AND **verify** only the desired accumulator shows a pressure increase while filling. ☐

4.4.1.3.13 WHEN accumulator level reaches the indicating range, THEN **verify** level indicators show approximately same level. ☐

4.4.1.3.14 IF level indicators are not approximately equal, THEN **contact** maintenance. ☐

NOTE

Ensure accumulator pressure does not exceed 645 psig during filling, which is the setpoint for accumulator high pressure alarm.

4.4.1.3.15 WHEN the accumulator is filled to approximately mid scale on the MCB level indicators (LI 920, LI922), THEN **perform** the following:

4.4.1.3.15.1 **Adjust** HYDRO TEST PMP DISCH CONT VLV full open using HIK 947. ☐

4.4.1.3.15.2 **Close** 1A ACCUM FILL LINE ISO, Q1E21HV8878A. ☐

4.4.1.3.15.3 **Close** 1A ACCUM N2 SUPP/VT ISO, Q1E21HV8875A. ☐

4.4.1.3.15.4 **Close** ACCUM FILL LINE ISO, Q1E21HV8860. ☐

4.4.1.3.15.5 **Stop** the hydro test pump. ☐

4.4.1.3.15.6 **Close** ACCUM N2 VENT HIK 936 (Q1G21V092). ☐

4.4.1.3.16 **Verify** HYDRO TEST PMP DISCH CONT VLV N1E21V313 fully open by adjusting HIK 947 on MCB to 100% demand. ☐

4.4.1.3.17 **Close** AND **lock** HYDRO TEST PUMP DISCH TO ACCUM, N1E21V085 (1-CVC-V-8967). ☐

4.4.1.3.18 **Close** HYDRO TEST PUMP SUCT, Q1E21V028 (1-CVC-V-8932). ☐

4.4.1.3.19 **Verify** ACCUM N2 VENT HIK-936 CLOSED. ☐

4.4.1.3.20 **Adjust** N2 SUPP TO ACCUM REGULATOR, N1E21V013 (1-CVC-PCV-8893) to approximately 25 psig. (Located in 121' PPR) ☐

4.4.1.3.21 **Open** the following valves on the PRIP:

- ACCUM N2 SUPPLY ISOLATION, N1E21HV3938A. ☐
- ACCUM N2 SUPPLY ISOLATION, N1E21HV3938B. ☐

4.4.1.3.22 **Open** 1A ACCUM N2 SUPP/VT ISO, Q1E21HV8875A. ☐

4.4.1.3.23 **Open** ACCUM N2 SUPPLY ISO, Q1E21HV8880. ☐

NOTE

The intent of the following is to pressurize the accumulator to approximately 25 psig. Stop at this point and wait for I&C to complete venting the lower level taps on the accumulator instruments. After venting is complete then continue with accumulator pressurization to the normal pressure band.

4.4.1.3.24 WHEN accumulator pressure reaches approximately 25 psig, THEN **perform** the following:

4.4.1.3.24.1 **Close** 1A ACCUM N2 SUPP/VT ISO, Q1E21HV8875A. ☐

4.4.1.3.24.2 **Close** the following valves on the PRIP: ☐

- ACCUM N2 SUPPLY ISOLATION, N1E21HV3938A. ☐
- ACCUM N2 SUPPLY ISOLATION, N1E21HV3938B. ☐

4.4.1.3.24.3 **Adjust** N2 SUPP TO ACCUM REGULATOR, N1E21V013 (1-CVC-PCV-8893) to approximately 625 PSIG. (Located in 121' PPR). ☐

4.4.1.3.24.4 **Close** ACCUM N2 SUPP ISO, Q1E21HV8880. ☐

4.4.1.3.24.5 **Have** I&C vent the lower level taps on the accumulator instruments. ☐

4.4.1.3.25 IF required, THEN **increase** accumulator pressure to the desired value per Section 4.5. ☐

4.4.2 Establishing a Nitrogen Atmosphere in Accumulator 1B

4.4.2.1 IF required, THEN **vent** accumulator 1B to zero psig per Section 4.8. ☐

4.4.2.2 **Open** the following valves:

- 1B ACCUM N2 SUPP/VT ISO, Q1E21HV8875B. ☐
- ACCUM N2 VENT HIK-936. ☐

4.4.2.3 **Fill** accumulator 1B per the following steps:

4.4.2.3.1 **Verify** RWST boron concentration is suitable for makeup to the accumulator. ☐

4.4.2.3.2 **Verify** HYDRO TEST PUMP SEAL OVERFLOW ISO, Q1E21V083 (1-CVC-V-8979) OPEN. ☐

4.4.2.3.3 **Open** HYDRO TEST PUMP SUCT, Q1E21V028 (1-CVC-V-8932). ☐

4.4.2.3.4 **Verify** HYDRO TEST PUMP DISCH CONT VLV HIK N1E21V313, HIK-947 set to 100% open on the MCB. ☐

4.4.2.3.5 **Verify** ACCUM N2 SUPP ISO, Q1E21HV8880 CLOSED. ☐

4.4.2.3.6 **Unlock** AND **open** HYDRO TEST PUMP DISCH TO ACCUM, N1E21V085 (1-CVC-V-8967). ☐

4.4.2.3.7 **Start** the hydro test pump using local handswitch N1E21HS2100F. ☐

4.4.2.3.8 **Open** ACCUM FILL LINE ISO, Q1E21HV8860. ☐

4.4.2.3.9 **Open** 1B ACCUM FILL LINE ISO, Q1E21HV8878B. ☐

CAUTION

Pressure should be adjusted gradually, reading pressure locally at hydro test pump on N1E21PI0947, while in contact with the Control Room (two people may be required locally to maintain communication). (CR 2008108980)

4.4.2.3.10 **Adjust** HYDRO TEST PUMP DISCH CONT VLV HIK 947 to maintain 665 psig on the local pressure indicator N1E21PI0947. ☐

4.4.2.3.11 **Monitor** accumulator water level indicators LI-920, 922, 924, 926, 928, and 930, AND **verify** only the desired accumulator shows an increase while filling. ☐

NOTE

If accumulator pressure increases to greater than 640 psig, then the hydro test pump must be stopped and the accumulator vented.

4.4.2.3.12 **Monitor** accumulator pressure indicators PI-921, 923, 925, 927, 929, and 931 AND **verify** only the desired accumulator shows a pressure increase while filling. ☐

4.4.2.3.13 WHEN accumulator level reaches the indicating range, THEN **verify** level indicators show approximately same level. ☐

4.4.2.3.14 IF level indicators are not approximately equal, THEN **contact** Maintenance. ☐

4.4.2.3.15 WHEN the accumulator is filled to approximately mid scale on the MCB level indicators (LI- 924, LI- 926), THEN **perform** the following:

4.4.2.3.15.1 **Adjust** HYDRO TEST PMP DISCH CONT VLV full open using HIK 947. ☐

4.4.2.3.15.2 **Close** 1B ACCUM FILL LINE ISO, Q1E21HV8878B. ☐

4.4.2.3.15.3 **Close** 1B ACCUM N2 SUPP/VT ISO, Q1E21HV8875B. ☐

4.4.2.3.15.4 **Close** ACCUM FILL LINE ISO, Q1E21HV8860. ☐

4.4.2.3.15.5 **Stop** the hydro test pump. ☐

4.4.2.3.15.6 **Close** ACCUM N2 VENT HIK 936 (Q1G21V092). ☐

4.4.2.3.16 **Verify** HYDRO TEST PMP DISCH CONT VLV N1E21V313 fully open by adjusting HIK 947 on MCB to 100% demand. ☐

4.4.2.3.17 **Close** AND **lock** HYDRO TEST PUMP DISCH TO ACCUM, N1E21V085 (1-CVC-V-8967). ☐

4.4.2.3.18 **Close** HYDRO TEST PUMP SUCT, Q1E21V028 (1-CVC-V-8932). ☐

4.4.2.3.19 **Verify** ACCUM N2 VENT HIK-936 CLOSED. ☐

4.4.2.3.20 **Adjust** N2 SUPP TO ACCUM REGULATOR, N1E21V013 (1-CVC-PCV-8893) to approximately 25 psig. (Located in 121' PPR) ☐

4.4.2.3.21 **Open** the following valves on the PRIP:

- ACCUM N2 SUPPLY ISOLATION, N1E21HV3938A. ☐
- ACCUM N2 SUPPLY ISOLATION, N1E21HV3938B. ☐

4.4.2.3.22 **Open** 1B ACCUM N2 SUPP/VT ISO, Q1E21HV8875B. ☐

4.4.2.3.23 **Open** ACCUM N2 SUPPLY ISO, Q1E21HV8880. ☐

NOTE

The intent of the following is to pressurize the accumulator to approximately 25 psig. Stop at this point and wait for I&C to complete venting the lower level taps on the accumulator instruments. After venting is complete then continue with accumulator pressurization to the normal pressure band.

4.4.2.3.24 WHEN accumulator pressure reaches approximately 25 psig, THEN **perform** the following:

4.4.2.3.24.1 **Close** 1B ACCUM N2 SUPP/VT ISO, Q1E21HV8875B. ☐

4.4.2.3.24.2 **Close** the following valves on the PRIP:

- ACCUM N2 SUPPLY ISOLATION, N1E21HV3938A. ☐
- ACCUM N2 SUPPLY ISOLATION, N1E21HV3938B. ☐

4.4.2.3.24.3 **Adjust** N2 SUPP TO ACCUM REGULATOR, N1E21V013 (1-CVC-PCV-8893) to approximately 625 PSIG. (Located in 121' PPR) ☐

4.4.2.3.24.4 **Close** ACCUM N2 SUPP ISO, Q1E21HV8880. ☐

4.4.2.3.24.5 **Have** I&C vent the lower level taps on the accumulator instruments. ☐

4.4.2.3.25 IF required, THEN **increase** accumulator pressure to the desired value per Section 4.5. ☐

4.4.3 Establishing a Nitrogen Atmosphere in Accumulator 1C

4.4.3.1 IF required, THEN **vent** accumulator 1C to zero psig per Section 4.8. ☐

4.4.3.2 **Open** the following valves:

- 1C ACCUM N2 SUPP/VT ISO, Q1E21HV8875C. ☐
- ACCUM N2 VENT HIK-936. ☐

4.4.3.3 **Fill** accumulator 1C per the following steps:

4.4.3.3.1 **Verify** RWST boron concentration is suitable for makeup to the accumulator. ☐

4.4.3.3.2 **Verify** HYDRO TEST PUMP SEAL OVERFLOW ISO, Q1E21V083 (1-CVC-V-8979) OPEN. ☐

4.4.3.3.3 **Open** HYDRO TEST PUMP SUCT, Q1E21V028 (1-CVC-V-8932). ☐

4.4.3.3.4 **Verify** HYDRO TEST PUMP DISCH CONT VLV HIK N1E21V313, HIK-947 set to 100% open on the MCB. ☐

4.4.3.3.5 **Verify** ACCUM N2 SUPP ISO, Q1E21HV8880 CLOSED. ☐

4.4.3.3.6 **Unlock** AND **open** HYDRO TEST PUMP DISCH TO ACCUM, N1E21V085 (1-CVC-V-8967). ☐

4.4.3.3.7 **Start** the hydro test pump using local handswitch N1E21HS2100F. ☐

4.4.3.3.8 **Open** ACCUM FILL LINE ISO, Q1E21HV8860. ☐

4.4.3.3.9 **Open** 1C ACCUM FILL LINE ISO, Q1E21HV8878C. ☐

CAUTION

Pressure should be adjusted gradually, reading pressure locally at hydro test pump on N1E21PI0947, while in contact with the Control Room (two people may be required locally to maintain communication). (CR 2008108980)

4.4.3.3.10 **Adjust** HYDRO TEST PUMP DISCH CONT VLV HIK 947 to maintain 665 psig on the local pressure indicator N1E21PI0947. ☐

4.4.3.3.11 **Monitor** accumulator water level indicators LI-920, 922, 924, 926, 928, and 930, AND **verify** only the desired accumulator shows an increase while filling. ☐

NOTE

If accumulator pressure increases to greater than 640 psig, then the hydro test pump must be stopped and the accumulator vented.

4.4.3.3.12 **Monitor** accumulator pressure indicators PI-921, 923, 925, 927, 929, and 931 AND **verify** only the desired accumulator shows a pressure increase while filling. ☐

4.4.3.3.13 WHEN accumulator level reaches the indicating range, THEN **verify** level indicators show approximately same level. ☐

4.4.3.3.14 IF level indicators are not approximately equal, THEN **contact** maintenance. ☐

NOTE

Ensure accumulator pressure does not exceed 645 psig during filling, which is the setpoint for accumulator high pressure alarm.

4.4.3.3.15 WHEN the accumulator is filled to approximately mid scale on the MCB level indicators (LI- 928, LI- 930), THEN **perform** the following:

4.4.3.3.15.1 **Adjust** HYDRO TEST PMP DISCH CONT VLV full open using HIK 947. ☐

4.4.3.3.15.2 **Close** 1C ACCUM FILL LINE ISO, Q1E21HV8878C. ☐

4.4.3.3.15.3 **Close** 1C ACCUM N2 SUPP/VT ISO, Q1E21HV8875C. ☐

4.4.3.3.15.4 **Close** ACCUM FILL LINE ISO, Q1E21HV8860. ☐

4.4.3.3.15.5 **Stop** the hydro test pump. ☐

4.4.3.3.15.6 **Close** ACCUM N2 VENT HIK 936 (Q1G21V092). ☐

4.4.3.3.16 **Verify** HYDRO TEST PMP DISCH CONT VLV N1E21V313 fully open by adjusting HIK 947 on MCB to 100% demand. ☐

4.4.3.3.17 **Close** AND **lock** HYDRO TEST PUMP DISCH TO ACCUM, N1E21V085 (1-CVC-V-8967). ☐

4.4.3.3.18 **Close** HYDRO TEST PUMP SUCT, Q1E21V028 (1-CVC-V-8932). ☐

4.4.3.3.19 **Verify** ACCUM N2 VENT HIK-936 CLOSED. ☐

4.4.3.3.20 **Adjust** N2 SUPP TO ACCUM REGULATOR, N1E21V013 (1-CVC-PCV-8893) to approximately 25 psig. (Located in 121' PPR) ☐

4.4.3.3.21 **Open** the following valves on the PRIP:

- ACCUM N2 SUPPLY ISOLATION, N1E21HV3938A. ☐
- ACCUM N2 SUPPLY ISOLATION, N1E21HV3938B. ☐

4.4.3.3.22 **Open** 1C ACCUM N2 SUPP/VT ISO, Q1E21HV8875C. ☐

4.4.3.3.23 **Open** ACCUM N2 SUPPLY ISO, Q1E21HV8880. ☐

NOTE

The intent of the following is to pressurize the accumulator to approximately 25 psig. Stop at this point and wait for I&C to complete venting the lower level taps on the accumulator instruments. After venting is complete then continue with accumulator pressurization to the normal pressure band.

4.4.3.3.24 WHEN accumulator pressure reaches approximately 25 psig, THEN **perform** the following:

4.4.3.3.24.1 **Close** 1C ACCUM N2 SUPP/VT ISO, Q1E21HV8875C. ☐

4.4.3.3.24.2 **Close** the following valves on the PRIP:

- ACCUM N2 SUPPLY ISOLATION, N1E21HV3938A. ☐
- ACCUM N2 SUPPLY ISOLATION, N1E21HV3938B. ☐

4.4.3.3.24.3 **Adjust** N2 SUPP TO ACCUM REGULATOR, N1E21V013 (1-CVC-PCV-8893) to approximately 625 PSIG. (Located in 121' PPR) ☐

4.4.3.3.24.4 **Close** ACCUM N2 SUPP ISO, Q1E21HV8880. ☐

4.4.3.3.24.5 **Have** I&C vent the lower level taps on the accumulator instruments. ☐

4.4.3.3.25 IF required, THEN **increase** accumulator pressure to the desired value per Section 4.5. ☐

CAUTIONS

- The nitrogen cover pressure should be maintained between 605 and 645 psig while in operational modes 1, 2, and 3 (with RCS pressure greater than 1000 psig).
- Cross-connection of accumulators via N2 or Fill lines is Prohibited in Modes 1, 2, or 3 (with RCS pressure greater than 1000 psig).

4.5 Increasing Accumulator Nitrogen Pressure

4.5.1 IF increasing accumulator nitrogen pressure after establishing nitrogen atmosphere per Section 4.4, THEN **ensure** the high pressure nitrogen banks are greater than 1000 psig. ☐

4.5.2 Increasing 1A Accumulator Nitrogen Pressure:

4.5.2.1 **Ensure** nitrogen atmosphere has been established in 1A accumulator. ☐

4.5.2.2 **Verify** ACCUM N2 VENT HIK 936(Q1E21V092) closed. ☐

4.5.2.3 **Open** OR **check open** the following valves on the PRIP:

- ACCUM N2 SUPPLY ISOLATION, N1E21HV3938A. ☐
- ACCUM N2 SUPPLY ISOLATION, N1E21HV3938B. ☐

4.5.2.4 **Open** OR **check open** ACCUM N2 SUPP ISO Q1E21HV8880, (Q1E21V059). ☐

4.5.2.5 **Open** 1A ACCUM N2 SUPP/VT ISO Q1E21HV8875A. ☐

4.5.2.6 **Monitor** accumulator pressure AND **verify** the pressure in accumulator 1A is the only accumulator which shows an increase in pressure. ☐

4.5.2.7 WHEN pressure increases to approximately 625 psig, THEN **close** 1A ACCUM N2 SUPP/VT ISO, Q1E21HV8875A.(Q1E21V047A). ☐

4.5.2.8 IF pressure is to be increased in another accumulator immediately, THEN **proceed** to Section 4.5.3 or 4.5.4. ☐

4.5.2.9 **Close** the following valves on the PRIP:

- ACCUM N2 SUPPLY ISOLATION, N1E21HV3938A. ☐
- ACCUM N2 SUPPLY ISOLATION, N1E21HV3938B. ☐

4.5.2.10 **Close** ACCUM N2 SUPP ISO Q1E21HV8880 (Q1E21V059). ☐

4.5.3 Increasing 1B Accumulator Nitrogen Pressure:

4.5.3.1 **Ensure** nitrogen atmosphere has been established in 1B accumulator. ☐

4.5.3.2 **Verify** ACCUM N2 VENT HIK 936(Q1E21V092) CLOSED. ☐

4.5.3.3 **Open** OR **check open** the following valves on the PRIP:

- ACCUM N2 SUPPLY ISOLATION, N1E21HV3938A. ☐
- ACCUM N2 SUPPLY ISOLATION, N1E21HV3938B. ☐

4.5.3.4 **Open** OR **check open** ACCUM N2 SUPP ISO Q1E21HV8880 (Q1E21V059). ☐

4.5.3.5 **Open** 1B ACCUM N2 SUPP/VT ISO Q1E21HV8875B. (Q1E21V047B). ☐

4.5.3.6 **Monitor** accumulator pressure AND **verify** the pressure in accumulator 1B is the only accumulator which shows an increase in pressure. ☐

4.5.3.7 WHEN pressure increases to approximately 625 psig, THEN **close** 1B ACCUM N2 SUPP/VT ISO, Q1E21HV8875B. ☐

4.5.3.8 IF pressure is to be increased in another accumulator immediately, THEN **proceed** to Section 4.5.2 or 4.5.4. ☐

4.5.3.9 **Close** the following valves on the PRIP:

- ACCUM N2 SUPPLY ISOLATION, N1E21HV3938A. ☐
- ACCUM N2 SUPPLY ISOLATION, N1E21HV3938B. ☐

4.5.3.10 **Close** ACCUM N2 SUPP ISO, Q1E21HV8880. ☐

4.5.4 Increasing 1C Accumulator Nitrogen Pressure:

4.5.4.1 **Ensure** that a nitrogen atmosphere has been established in 1C accumulator. ☐

4.5.4.2 **Verify** ACCUM N2 VENT HIK 936(Q1E21V092) CLOSED. ☐

4.5.4.3 **Open** OR **check** open the following valves on the PRIP:

- ACCUM N2 SUPPLY ISOLATION, N1E21HV3938A. ☐
- ACCUM N2 SUPPLY ISOLATION, N1E21HV3938B. ☐

4.5.4.4 **Open** OR **check open** ACCUM N2 SUPP ISO Q1E21HV8880 (Q1E21V059). ☐

4.5.4.5 **Open** 1C ACCUM N2 SUPP/VT ISO Q1E21HV8875C (Q1E21V047C). ☐

4.5.4.6 **Monitor** accumulator pressure AND **verify** the pressure in accumulator 1C is the only accumulator which shows an increase in pressure. ☐

4.5.4.7 WHEN pressure increases to approximately 625 psig, THEN **close** 1C ACCUM N2 SUPP/VT ISO, Q1E21HV8875C. ☐

4.5.4.8 IF pressure is to be increased in another accumulator immediately, THEN **proceed** to Section 4.5.2 or 4.5.3. ☐

4.5.4.9 **Close** the following valves on the PRIP:

- ACCUM N2 SUPPLY ISOLATION, N1E21HV3938A. ☐
- ACCUM N2 SUPPLY ISOLATION, N1E21HV3938B. ☐

4.5.4.10 **Close** ACCUM N2 SUPP ISO, Q1E21HV8880. ☐

CAUTIONS

- The nitrogen cover pressure should be maintained between 605 and 645 psig while in operational modes 1, 2, and 3 (with RCS pressure greater than 1000 psig).
- Cross-connection of accumulators via N2 or Fill lines is Prohibited in Modes 1, 2, or 3 (with RCS pressure greater than 1000 psig).

4.6 Venting Accumulators

4.6.1 **Coordinate** with OCC or CTMT Coordinator to determine the most appropriate time to start venting accumulators. ☐

4.6.2 Prior to venting, **alert** personnel in containment that nitrogen will be vented from the accumulators into the containment atmosphere. ☐

4.6.3 Venting 1A Accumulator:

4.6.3.1 **Open** 1A ACCUM N2 SUPP/VT ISO, Q1E21HV8875A. ☐

4.6.3.2 **Slowly** open ACCUM N2 VENT, HIK 936(Q1G21V092). ☐

4.6.3.3 **Monitor** accumulator pressure AND **verify** the pressure in accumulator 1A is the only accumulator which shows a decrease in pressure. ☐

4.6.3.4 WHEN pressure decreases to the desired value, THEN **close** ACCUM N2 VENT, HIK 936(Q1G21V092). ☐

4.6.3.5 **Close** 1A ACCUM N2 SUPP/VT ISO, Q1E21HV8875A. ☐

4.6.4 Venting 1B Accumulator:

4.6.4.1 **Open** 1B ACCUM N2 SUPP/VT ISO, Q1E21HV8875B. ☐

4.6.4.2 Slowly **open** ACCUM N2 VENT, HIK 936(Q1G21V092). ☐

4.6.4.3 **Monitor** accumulator pressure AND **verify** the pressure in accumulator 1B is the only accumulator which shows a decrease in pressure. ☐

4.6.4.4 WHEN pressure decreases to the desired value, THEN **close** ACCUM N2 VENT, HIK 936(Q1G21V092). ☐

4.6.4.5 **Close** 1B ACCUM N2 SUPP/VT ISO, Q1E21HV8875B. ☐

4.6.5 Venting 1C Accumulator:

4.6.5.1 **Open** 1C ACCUM N2 SUPP/VT ISO, Q1E21HV8875C. ☐

4.6.5.2 Slowly **open** ACCUM N2 VENT, HIK 936(Q1G21V092). ☐

4.6.5.3 **Monitor** accumulator pressure AND **verify** the pressure in accumulator 1C is the only accumulator which shows a decrease in pressure. ☐

4.6.5.4 WHEN pressure decreases to the desired value, THEN **close** ACCUM N2 VENT, HIK 936(Q1G21V092). ☐

4.6.5.5 **Close** 1C ACCUM N2 SUPP/VT ISO, Q1E21HV8875C. ☐

NOTE

The accumulators may be pump to the RWST in any order.

4.7 Pumping Accumulators to RWST With RCS Pressure Less Than 1000 psig

4.7.1 **Coordinate** with OCC or CTMT Coordinator to determine the most appropriate time to vent accumulators. ☐

4.7.2 **Verify** that the RCDT system is aligned for normal operation per Liquid Waste Processing System FNP-1-SOP-50.0A (with exceptions noted). ☐

4.7.3 Pumping 1A Accumulator to the RWST:

4.7.3.1 Prior to venting, **alert** personnel in containment that nitrogen will be vented from the accumulators into the containment atmosphere. ☐

4.7.3.2 **Verify** 1A ACCUM DISCH ISO, Q1E21MOV8808A is CLOSED**.** ☐

4.7.3.3 **Verify** 1A ACCUM N2 SUPP/VT ISO, Q1E21HV8875A OPEN. ☐

4.7.3.4 SLOWLY **open** ACCUM N2 VENT HIK 936 (Q1G21V092). ☐

4.7.3.5 **Decrease** accumulator pressure to 0 psig. ☐

4.7.3.6 **Verify** the following valves CLOSED:

- 1A ACCUM DRAIN TO RCDT, Q1E21V041A (1-CVC-V-8955A). ☐
- SIS 1A ACCUM DRN, Q1G21V255A (1-LWP-V-7130A). ☐

4.7.3.7 **Notify** Maintenance to install spool piece in Accumulator 1A drain line to RCDT pump suction. ☐

4.7.3.8 WHEN spool piece is installed THEN, **Open** 1A ACCUM DRAIN TO RCDT, Q1E21V041A (1-CVC-V-8955A). ☐

4.7.3.9 **Stop** OR **verify** stopped the following RCDT pumps:

4.7.3.9.1 RCDT pump 1A. ☐

4.7.3.9.2 RCDT pump 1B. ☐

4.7.3.10 **Close** the following valves:

- RCDT OUTLET ISO, N1G21HV7127. ☐
- RCDT RECIRC ISO, N1G21HV7144. ☐

NOTE

When the following lineup is complete, the source and receipt tanks should be frequently monitored for level changes. Due to the different elevations and system pressures, fluid may transfer with or without RCDT Pump operation. (CR2010106296)

4.7.3.11 **Open** the following valves:

- SIS 1A ACCUM DRN, Q1G21V255A (1-LWP-V-7130A). ☐
- RCDT LCV, Q1G21LCV1003. ☐

4.7.3.12 **Verify closed** OR **close** the following valves:

- RCDT DISCH TO WHT, Q1G21V009 (1-LWP-V-7137). ☐
- RCDT PUMP DISCH TO RHT ISO, Q1E21V315 (1-CVC-V-8551). ☐

4.7.3.13 **Verify** SFP purification loop is NOT in operation per FNP-1-SOP-54.0, Spent Fuel Pit Cooling And Purification System. ☐

4.7.3.14 IF RWST purification is in operation, THEN **perform** the following:

4.7.3.14.1 **Stop** the refueling water purification pump. ☐

4.7.3.14.2 **Close** Q1G31HV033A, RWST TO RWPP AUTO ISO (MCB) ☐

4.7.3.14.3 **Close** Q1G31HV033B, RWST TO RWPP AUTO ISO (MCB) ☐

4.7.3.15 **Open** OR **verify open** the following valves:

- RWP PUMP DISCH LINE ISO, N1G31V008 (1-SFP-V-8792). ☐
- SFP PURIF OUTLET TO RWST, N1G31V021B (1-SFP-V-8793B). ☐

4.7.3.16 **Verify** RCDT PUMPS DISCH LINE ISO, Q1G21HV7136 OPEN. ☐

4.7.3.17 **Place** the handswitch for RCDT PUMPS DISCH LINE ISO, Q1G21HV7136 in the AUTO position. ☐

NOTE

The operation of the refueling water purification pump is not required. SFP PURIF OUTLET TO RWST, N1G31V021B (1-SFP-V-8793B) should be throttled as necessary to limit flow through SFP demineralizer to ≤ 100 GPM on FI-654.

4.7.3.18 **Open** RCDT DISCH TO SFPCS RWPP SUCT, Q1G21V008 (1-LWP-V-7138). ☐

4.7.3.19 **Open** RCDT LCV, Q1G21LCV1003. ☐

4.7.3.20 **Start** one of the following RCDT pumps:

- RCDT pump 1A. ☐

OR

- RCDT pump 1B. ☐

NOTE

The RWP pump is not required; however, experience has shown it greatly increases flow and it is normally desired to have running.

CAUTION

The RWP pump does not have a low flow trip.

4.7.3.21 IF desired when pumping to the RWST, THEN **start** the RWP pump as follows:

4.7.3.21.1 **Notify** an operator at the refueling water purification pump to monitor discharge pressure of the pump. ☐

4.7.3.21.2 IF the RWP pump discharge pressure indicator PI-3924 indicates a positive pressure due to a running RCDT pump, THEN the RWP pump may be **started**. ☐

NOTE

Two RCDT pumps may be required to prevent the RWP pump from cavitating. If a second RCDT pump is started, RCDT pump discharge pressure should be monitored to ensure the relief valve is not challenged (< 150 psig).

CAUTION

RCDT pump discharge piping is protected from over pressurization by a relief valve at penetration 31 outside containment which discharges to the equipment drains. This relief valve can sustain seat leakage at pressures above 150 psig

4.7.3.22 IF necessary to prevent RWP pump cavitation, THEN **start** the second RCDT pump. ☐

NOTE

If the RCDT pump discharge flow decreases to less than 85 gpm, the operating RCDT pump will automatically stop.

4.7.3.23 WHEN draining is complete on 1A accumulator, THEN **perform** the following for the affected accumulator:

4.7.3.24 IF draining on all accumulators complete, THEN **stop** the REFUEL WATER PURIFICATION PUMP IF running. ☐

4.7.3.24.1 IF draining on all accumulators complete, THEN **secure** the RCDT pump(s). ☐

4.7.3.24.2 **Close** SI SYS 1A ACCUM DRN, Q1G21V255A (1-LWP-V-7130A). ☐

4.7.3.24.3 **Close** 1A ACCUM DRAIN TO RCDT, Q1E21V041A (1-CVC-V-8955A). ☐

4.7.3.25 **Go To** Section 4.7.4, 4.7.5 or 4.7.6 as required. ☐

4.7.4 Pumping 1B Accumulator to the RWST:

4.7.4.1 Prior to venting, **alert** personnel in Containment that nitrogen will be vented from the accumulators into the containment atmosphere. ☐

4.7.4.2 **Verify** 1B ACCUM DISCH ISO, Q1E21MOV8808B is CLOSED. ☐

4.7.4.3 **Verify** 1B ACCUM N2 SUPP/VT ISO, Q1E21HV8875B is OPEN. ☐

4.7.4.4 SLOWLY **open** ACCUM N2 VENT HIK 936 (Q1G21V092). ☐

4.7.4.5 **Decrease** accumulator pressure to 0 psig. ☐

4.7.4.6 **Verify** the following valves CLOSED:

- 1B ACCUM DRAIN TO RCDT, Q1E21V041B (1-CVC-V-8955B). ☐
- SIS 1B ACCUM DRN, Q1G21V255B (1-LWP-V-7130B). ☐

4.7.4.7 **Notify** Maintenance to install spool piece in accumulator 1B drain line to RCDT pump suction. ☐

4.7.4.8 WHEN spool piece is installed THEN, **Open** 1B ACCUM DRAIN TO RCDT, Q1E21V041B (1-CVC-V-8955B). ☐

4.7.4.9 **Verify** RCDT pumps 1A and 1B STOPPED. ☐

4.7.4.10 **Close** the following valves:

- RCDT OUTLET ISO, N1G21HV7127. ☐
- RCDT RECIRC ISO, N1G21HV7144. ☐

NOTE

When the following lineup is complete, the source and receipt tanks should be frequently monitored for level changes. Due to the different elevations and system pressures, fluid may transfer with or without RCDT Pump operation. (CR2010106296)

4.7.4.11 **Open** the following valves:

- SIS 1B ACCUM DRN, Q1G21V255A (1-LWP-V-7130B). ☐
- RCDT LCV, Q1G21LCV1003. ☐

4.7.4.12 **Verify closed** OR **close** the following valves.

- CDT DISCH TO WHT, Q1G21V009 (1-LWP-V-7137). ☐
- RCDT PUMP DISCH TO RHT ISO, Q1E21V315 (1-CVC-V-8551). ☐

4.7.4.13 **Verify** SFP purification loop is NOT in operation per FNP-1-SOP-54.0, Spent Fuel Pit Cooling And Purification System. ☐

4.7.4.14 IF RWST purification is in operation, THEN **perform** the following:

4.7.4.14.1 **Stop** the refueling water purification pump. ☐

4.7.4.14.2 **Close** Q1G31HV033A, RWST TO RWPP AUTO ISO (MCB) ☐

4.7.4.14.3 **Close** Q1G31HV033B, RWST TO RWPP AUTO ISO (MCB) ☐

4.7.4.15 **Open** OR **verify open** the following valves:

- RWP PUMP DISCH LINE ISO, N1G31V008 (1-SFP-V-8792). ☐
- SFP PURIF OUTLET TO RWST, N1G31V021B (1-SFP-V-8793B). ☐

4.7.4.16 **Verify** RCDT PUMPS DISCH LINE ISO, Q1G21HV7136 OPEN. ☐

4.7.4.17 **Place** the handswitch for RCDT PUMPS DISCH LINE ISO, Q1G21HV7136 in the AUTO position. ☐

NOTE

The operation of the refueling water purification pump is not required. SFP PURIF OUTLET TO RWST, N1G31V021B (1-SFP-V-8793B) should be throttled as necessary to limit flow through SFP demineralizer to ≤ 100 GPM on FI-654.

4.7.4.18 **Open** RCDT DISCH TO SFPCS RWPP SUCT, Q1G21V008 (1-LWP-V-7138). ☐

4.7.4.19 **Open** RCDT LCV, Q1G21LCV1003. ☐

4.7.4.20 **Start** one of the following RCDT pumps:

- RCDT pump 1A. ☐

OR

- RCDT pump 1B. ☐

NOTE

The RWP pump is not required; however, experience has shown it greatly increases flow and it is normally desired to have running.

CAUTION

The RWP pump does not have a low flow trip.

4.7.4.21 IF desired when pumping to the RWST, THEN **start** the RWP pump as follows:

4.7.4.21.1 **Notify** an operator at the refueling water purification pump to monitor discharge pressure of the pump. ☐

4.7.4.21.2 IF the RWP pump discharge pressure indicator PI-3924 indicates a positive pressure due to a running RCDT pump, THEN the RWP pump may be **started**. ☐

NOTE

Two RCDT pumps may be required to prevent the RWP pump from cavitating. If a second RCDT pump is started, RCDT pump discharge pressure should be monitored to ensure the relief valve is not challenged (< 150 psig).

CAUTION

RCDT pump discharge piping is protected from over pressurization by a relief valve at penetration 31 outside containment which discharges to the equipment drains. This relief valve can sustain seat leakage at pressures above 150 psig.

4.7.4.22 IF necessary to prevent RWP pump cavitation, THEN **start** the second RCDT pump. ☐

NOTE

If the RCDT pump discharge flow decreases to less than 85 gpm, the operating RCDT pump will automatically stop.

4.7.4.23 WHEN draining is complete on 1B accumulator, THEN **perform** the following for the affected accumulator:

4.7.4.23.1 IF draining on all accumulators complete, THEN **stop** the REFUEL WATER PURIFICATION PUMP, IF running. ☐

4.7.4.23.2 IF draining on all accumulators complete, THEN **secure** the RCDT pump(s). ☐

4.7.4.23.3 **Close** SI SYS 1B ACCUM DRN, Q1G21V255B(1-LWP-V-7130B). ☐

4.7.4.23.4 **Close** 1B ACCUM DRAIN TO RCDT, Q1E21V041B (1-CVC-V-8955B). ☐

4.7.4.24 **Go** to Section 4.7.3, 4.7.5 or 4.7.6 as required. ☐

4.7.5 Pumping 1C Accumulator to the RWST:

4.7.5.1 Prior to venting, **alert** personnel in Containment that nitrogen will be vented from the accumulators into the containment atmosphere. ☐

4.7.5.2 **Verify** 1C ACCUM DISCH ISO, Q1E21MOV8808C is CLOSED. ☐

4.7.5.3 **Verify** 1C ACCUM N2 SUPP/VT ISO, Q1E21HV8875C is OPEN. ☐

4.7.5.4 SLOWLY **open** ACCUM N2 VENT HIK 936 (Q1G21V092). ☐

4.7.5.5 **Decrease** accumulator pressure to 0 psig. ☐

4.7.5.6 **Verify** the following valves CLOSED:

- 1C ACCUM DRAIN TO RCDT, Q1E21V041C (1-CVC-V-8955C). ☐
- SI SYS 1C ACCUM DRN, Q1G21V255C (1-LWP-V-7130C). ☐

4.7.5.7 Notify Maintenance to install spool piece in accumulator 1C drain line to RCDT pump suction. ☐

4.7.5.8 WHEN spool piece is installed THEN, **Open** 1C ACCUM DRAIN TO RCDT, Q1E21V041C (1-CVC-V-8955C). ☐

4.7.5.9 **Verify** RCDT pumps 1A and 1B STOPPED. ☐

4.7.5.10 **Close** the following valves:

- RCDT OUTLET ISO, N1G21HV7127 (N1G21V006). ☐
- RCDT RECIRC ISO, N1G21HV7144 (N1G21V106). ☐

NOTE

When the following lineup is complete, the source and receipt tanks should be frequently monitored for level changes. Due to the different elevations and system pressures, fluid may transfer with or without RCDT Pump operation. (CR2010106296)

4.7.5.11 **Open** the following valves:

- SI SYS 1C ACCUM DRN, Q1G21V255C (1-LWP-V-7130C). ☐
- RCDT LCV Q1G21LCV1003 (Q1G21V064). ☐

4.7.5.12 **Verify closed** OR **close** the following valves:

- RCDT DISCH TO WHT Q1G21V009 (1-LWP-V-7137). ☐
- RCDT PUMP DISCH TO RHT ISO Q1E21V315 (1-CVC-V-8551). ☐

4.7.5.13 **Verify** SFP purification loop is NOT in operation per FNP-1-SOP-54.0, Spent Fuel Pit Cooling and Purification System. ☐

4.7.5.14 IF RWST purification is in operation, THEN **perform** the following:

4.7.5.14.1 **Stop** the refueling water purification pump. ☐

4.7.5.14.2 **Close** Q1G31HV033A, RWST TO RWPP AUTO ISO (MCB) ☐

4.7.5.14.3 **Close** Q1G31HV033B, RWST TO RWPP AUTO ISO (MCB) ☐

4.7.5.15 **Open** or **verify open** the following valves:

- RWP PUMP DISCH LINE ISO, N1G31V008 (1-SFP-V-8792). ☐
- SFP PURIF OUTLET TO RWST N1G31V021B (1-SFP-V-8793B). ☐

4.7.5.16 **Verify** RCDT PUMPS DISCH LINE ISO Q1G21HV7136 (Q1G21V006) OPEN. ☐

4.7.5.17 **Place** the handswitch for RCDT PUMPS DISCH LINE ISO Q1G21HV7136 (Q1G21V006) is in the AUTO position. ☐

NOTE

The operation of the refueling water purification pump is not required. 1-SFP-V-8793B (N1G31V021B) should be throttled as necessary to limit flow through SFP demineralizer to ≤ 100 GPM on FI-654.

4.7.5.18 **Open** RCDT DISCH TO SFPCS RWPP SUCT Q1G21V008 (1-LWP-V-7138). ☐

4.7.5.19 **Open** RCDT LCV Q1G21LCV1003 (Q1G21V064). ☐

4.7.5.20 **Start** one of the following RCDT pumps:

- RCDT pump 1A. ☐

OR

- RCDT pump 1B. ☐

NOTE

The RWP pump is not required; however, experience has shown it greatly increases flow and it is normally desired to have running.

CAUTION

The RWP pump does not have a low flow trip.

4.7.5.21 IF desired when pumping to the RWST, THEN **start** the RWP pump as follows:

4.7.5.21.1 **Notify** an operator at the refueling water purification pump to monitor discharge pressure of the pump. ☐

4.7.5.21.2 IF the RWP pump discharge pressure indicator PI-3924 indicates a positive pressure due to a running RCDT pump, THEN the RWP pump may be **started**. ☐

NOTE

Two RCDT pumps may be required to prevent the RWP pump from cavitating. If a second RCDT pump is started,RCDT pump discharge pressure should be monitored to ensure the relief valve is not challenged (< 150 psig).

CAUTION

RCDT pump discharge piping is protected from over pressurization by a relief valve at penetration 31 outside containment which discharges to the equipment drains. This relief valve can sustain seat leakage at pressures above 150 psig.

4.7.5.22 IF necessary to prevent RWP pump cavitation, THEN **start** the second RCDT pump. ☐

NOTE

If the RCDT pump discharge flow decreases to less than 85 gpm, the operating RCDT pump will automatically stop.

4.7.5.23 WHEN draining is complete on 1C accumulator, THEN **perform** the following for the affected accumulator:

4.7.5.23.1 IF draining on all accumulators complete, THEN **stop** the REFUEL WATER PURIFICATION PUMP, IF running. ☐

4.7.5.23.2 IF draining on all accumulators complete, THEN **secure** the RCDT pump(s). ☐

4.7.5.23.3 **Close** SI SYS 1C ACCUM DRN, Q1G21V255C (1-LWP-V-7130C). ☐

4.7.5.23.4 **Close** 1C ACCUM DRAIN TO RCDT, Q1E21V041C (1-CVC-V-8955C). ☐

4.7.5.24 **Go To** sections 4.7.3, 4.7.4 or 4.7.6 as required. ☐

NOTE

The remainder of this procedure section is meant to be performed after all accumulator draining is completed.

4.7.6 Realignment After Pumping to the RWST:

4.7.6.1 IF running, THEN **stop** the REFUEL WATER PURIFICATION PUMP. ☐

4.7.6.2 IF running, THEN **shutdown** the RCDT pump(s). ☐

4.7.6.3 **Realign** valves as follows:

4.7.6.3.1 **Close** RCDT DISCH TO SFPCS RWPP SUCT, Q1G21V008 (1-LWP-V-7138). ☐

4.7.6.3.2 **Close** RWP PUMP DISCH LINE ISO, N1G31V008 (1-SFP-V-8792). ☐

4.7.6.3.3 **Close** SFP PURIF OUTLET TO RWST N1G31V021B (1-SFP-V-8793B). ☐

4.7.6.3.4 **Close** RCDT LCV Q1G21LCV1003 (Q1G21V064). ☐

4.7.6.3.5 **Open** RCDT to RHT Q1E21V315 (1-CVC-V8551) ☐

4.7.6.4 **Open** the following valves:

- RCDT OUTLET ISO N1G21HV7127 (N1G21V006). ☐
- RCDT RECIRC ISO N1G21HV7144 (N1G21V106). ☐

4.7.6.5 **Restore** the RCDT to normal operation per FNP-1-SOP-50.0, Liquid Waste Processing System. ☐

4.7.6.6 **Close** the following valves:

- ACCUM N2 VT HIK-936 (Q1E21V092). ☐
- 1C ACCUM N2 SUPP/VT ISO Q1E21HV8875C (Q1E21V047C). ☐

4.7.6.7 **Notify** Maintenance to remove spool piece from accumulator drain lines to RCDT pump suction. ☐

4.7.6.8 **Realign** RWST OR SFP purification as required. ☐

NOTE

This section should only be used in Modes 4, 5 or 6 and is intended to maintain the accumulators in a depressurized state. Steps 4.8.3, 4.8.4 and 4.8.5 may be performed in any order.

4.8 Complete Depressurization of All Accumulators to Support Outage Activities

4.8.1 **Coordinate** with OCC or CTMT Coordinator to determine the most appropriate time to start venting accumulators. ☐

4.8.2 Prior to venting, **alert** personnel in containment that nitrogen will be vented from the accumulators into the containment atmosphere. ☐

4.8.3 Depressurizing 1A Accumulator:

4.8.3.1 **Open** 1A ACCUM N2 SUPP/VT ISO, Q1E21HV8875A. ☐

4.8.3.2 SLOWLY **open** ACCUM N2 VENT, HIK 936 (Q1G21V092). ☐

4.8.3.3 **Monitor** accumulator pressure AND **verify** the pressure in accumulator 1A is the only accumulator which shows a decrease in pressure. ☐

4.8.3.4 WHEN pressure decreases to zero, THEN **close** ACCUM N2 VENT, HIK 936 (Q1G21V092). ☐

4.8.3.5 **Close** 1A ACCUM N2 SUPP/VT ISO, Q1E21HV8875A. ☐

4.8.4 Depressurizing 1B Accumulator:

4.8.4.1 **Open** 1B ACCUM N2 SUPP/VT ISO, Q1E21HV8875B. ☐

4.8.4.2 SLOWLY **open** ACCUM N2 VENT, HIK 936 (Q1G21V092). ☐

4.8.4.3 **Monitor** accumulator pressure AND **verify** the pressure in accumulator 1B is the only accumulator which shows a decrease in pressure. ☐

4.8.4.4 WHEN pressure decreases to zero, THEN **close** ACCUM N2 VENT, HIK 936 (Q1G21V092). ☐

4.8.4.5 **Close** 1B ACCUM N2 SUPP/VT ISO, Q1E21HV8875B. ☐

4.8.5 Depressurizing 1C Accumulator:

4.8.5.1 **Open** 1C ACCUM N2 SUPP/VT ISO, Q1E21HV8875C. ☐

4.8.5.2 SLOWLY **open** ACCUM N2 VENT, HIK 936 (Q1G21V092). ☐

4.8.5.3 **Monitor** accumulator pressure AND **verify** the pressure in accumulator 1C is the only accumulator which shows a decrease in pressure. ☐

4.8.5.4 WHEN pressure decreases to zero, THEN **close** ACCUM N2 VENT, HIK 936(Q1G21V092). ☐

4.8.5.5 **Close** 1C ACCUM N2 SUPP/VT ISO, Q1E21HV8875C. ☐

4.8.6 WHEN all accumulators have been depressurized, THEN **perform** the following:

4.8.6.1 **Open** the following valves:

- 1A ACCUM N2 SUPP/VT ISO, Q1E21HV8875A. ☐
- 1B ACCUM N2 SUPP/VT ISO, Q1E21HV8875B. ☐
- 1C ACCUM N2 SUPP/VT ISO, Q1E21HV8875C. ☐

4.8.6.2 Slowly **open** ACCUM N2 VENT, HIK 936(Q1G21V092). ☐

4.8.7 WHEN activities are complete that required complete depressurization of the accumulators, THEN **perform** the following:

4.8.7.1 **Close** the following valves:

- 1A ACCUM N2 SUPP/VT ISO, Q1E21HV8875A. ☐
- 1B ACCUM N2 SUPP/VT ISO, Q1E21HV8875B. ☐
- 1C ACCUM N2 SUPP/VT ISO, Q1E21HV8875C. ☐

4.8.7.2 **Close** ACCUM N2 VENT, HIK 936(Q1G21V092). ☐

CAUTIONS

The nitrogen cover pressure should be maintained between 605 and 645 psig while in operational modes 1, 2, and 3 (with RCS pressure greater than 1000 psig).

Cross-connection of accumulators via N2 or Fill lines is Prohibited in Modes 1, 2, or 3 (with RCS pressure greater than 1000 psig).

4.9 Increasing Accumulator Nitrogen Pressure Using temporary Bottles

4.9.1 **Ensure** a nitrogen atmosphere has been established in the accumulator(s) to be pressurized. ☐

4.9.2 **Verify** ACCUM N2 VT HIK 936 (Q1E21V092) CLOSED. ☐

4.9.3 **Close** the following valves:

- ACCUM N2 SUPPLY ROOT (Active Bank) N1E21V002A.(Aux. BLDG 155' Nitrogen Storage Rm.) ☐
- ACCUM N2 SUPPLY ROOT (Reserve Bank) N1E21V002B. (Aux. BLDG 155' Nitrogen Storage Rm.) ☐

4.9.4 **Verify** the following valves CLOSED:

- PRIP NITROGEN SUPPLY ISOLATION VALVE N1E21HV3938A. ☐
- PRIP NITROGEN SUPPLY ISOLATION VALVE N1E21HV3938B. ☐

NOTE

It will take approximately 3 Nitrogen bottles to raise accumulator pressure from 610 psig to 625 psig.

4.9.5 **Secure** the required Nitrogen bottles near penetration 63. (121' Piping Pen Rm.) ☐

4.9.6 **Install** a regulator capable of supplying 650 psig pressure on one of the N2 bottles AND **connect** discharge to piping downstream of ACCUM N2 SUPP TEST DRAIN, N1E21V303B. ☐

4.9.7 **Open** the isolation valve on the Nitrogen bottle AND **adjust** the output of the regulator to approximately 625 psig. ☐

4.9.8 **Open** the following valves:

- ACCUM N2 SUPPLY TEST DRAIN ISOL N1E21V303B. ☐
- ACCUM N2 SUPPLY TEST DRAIN ROOT N1E21V303A. ☐

4.9.9 **Open** ACCUM N2 SUPP ISO Q1E21HV8880 (Q1E21V059). ☐

4.9.10 IF pressurizing 1A Accumulator, THEN **perform** the following:

4.9.10.1 **Open** 1A ACCUM N2 SUPP/VT ISO Q1E21HV8875A (Q1E21V047A). ☐

4.9.10.2 **Monitor** accumulator pressure AND **verify** the pressure in accumulator 1A is the only accumulator which shows an increase in pressure. ☐

4.9.10.3 IF necessary to change out bottles while increasing pressure, THEN:

4.9.10.3.1 **Close** ACCUM N2 SUPPLY TEST DRAIN ISOL N1E21V303B. ☐

4.9.10.3.2 **Close** the isolation valve on the in use Nitrogen bottle. ☐

4.9.10.3.3 **Remove** the regulator from the in use Nitrogen bottle. ☐

4.9.10.3.4 **Install** the regulator on a full Nitrogen bottle. ☐

4.9.10.3.5 **Open** the Nitrogen bottle isolation valve. ☐

4.9.10.3.6 **Ensure** that the regulator is still set for approximately 625 psig. ☐

4.9.10.3.7 **Open** ACCUM N2 SUPPLY TEST DRAIN ISOL N1E21V303B. ☐

4.9.10.4 WHEN pressure increases to approximately 625 psig, THEN **close** 1A ACCUM N2 SUPP/VT ISO Q1E21HV8875A (Q1E21V047A). ☐

4.9.11 IF pressurizing 1B Accumulator, THEN **perform** the following:

4.9.11.1 **Open** 1B ACCUM. N2 SUPP/VT ISO Q1E21HV8875B (Q1E21V047B). ☐

4.9.11.2 **Monitor** accumulator pressure AND **verify** the pressure in accumulator 1B is the only accumulator which shows an increase in pressure. ☐

4.9.11.3 IF necessary to **change** out bottles while increasing pressure, THEN:

4.9.11.3.1 **Close** ACCUM N2 SUPPLY TEST DRAIN ISOL N1E21V303B. ☐

4.9.11.3.2 **Close** the isolation valve on the in use Nitrogen bottle. ☐

4.9.11.3.3 **Remove** the regulator from the in use Nitrogen bottle. ☐

4.9.11.3.4 **Install** the regulator on a full Nitrogen bottle. ☐

4.9.11.3.5 **Open** the Nitrogen bottle isolation valve. ☐

4.9.11.3.6 **Ensure** that the regulator is still set for approximately 625 psig. ☐

4.9.11.3.7 **Open** ACCUM N2 SUPPLY TEST DRAIN ISOL N1E21V303B. ☐

4.9.11.4 WHEN pressure increases to approximately 625 psig, THEN **close** 1B ACCUM N2 SUPP/VT ISO Q1E21HV8875B (Q1E21V047B). ☐

4.9.12 IF pressurizing 1C Accumulator, THEN **perform** the following:

4.9.12.1 **Open** 1C ACCUM. N2 SUPP/VT ISO Q1E21HV8875C (Q1E21V047C). ☐

4.9.12.2 **Monitor** accumulator pressure AND **verify** the pressure in accumulator 1C is the only accumulator which shows an increase in pressure. ☐

4.9.12.3 IF necessary to change out bottles while increasing pressure, THEN:

4.9.12.3.1 **Close** ACCUM N2 SUPPLY TEST DRAIN ISOL N1E21V303B. ☐

4.9.12.3.2 **Close** the isolation valve on the in use Nitrogen bottle. ☐

4.9.12.3.3 **Remove** the regulator from the in use Nitrogen bottle. ☐

4.9.12.3.4 **Install** the regulator on a full Nitrogen bottle. ☐

4.9.12.3.5 **Open** the Nitrogen bottle isolation valve. ☐

4.9.12.3.6 **Ensure** that the regulator is still set for approximately 625 psig. ☐

4.9.12.3.7 **Open** ACCUM N2 SUPPLY TEST DRAIN ISOL N1E21V303B. ☐

4.9.12.4 WHEN pressure increases to approximately 625 psig, THEN **close** 1C ACCUM N2 SUPP/VT ISO Q1E21HV8875C (Q1E21V047C). ☐

4.9.13 **Close** the following valves:

- ACCUM N2 SUPPLY TEST DRAIN ISOL N1E21V303B. ☐
- ACCUM N2 SUPPLY TEST DRAIN ROOT N1E21V303A. ☐

4.9.14 **Close** ACCUM N2 SUPP ISO Q1E21HV8880 (Q1E21V059). ☐

4.9.15 **Open** ACCUM N2 SUPPLY ROOT (Active Bank) N1E21V002A. (Aux. BLDG 155' Nitrogen Storage Rm.) ☐

4.9.16 WHEN nitrogen bottles are no longer required, THEN **perform** the following:

4.9.16.1 **Ensure** isolation valve on the nitrogen bottle connected for use is closed. ☐

4.9.16.2 **Disconnect** the regulator from ACCUM N2 SUPPLY TEST DRAIN ISOL N1E21V303B. ☐

4.9.16.3 **Disconnect** regulator from the nitrogen bottle. ☐

4.9.16.4 **Remove** all nitrogen bottles and the regulator from the 121 piping penetration room. ☐

4.9.16.5 **Place** the nitrogen bottles and regulator in the appropriate storage locations. ☐

5.0 References

5.1 D-175038 (Sh 1-2), Safety Injection System

5.2 D-175039 (Sh 1-4), CVCS

5.3 D-175042 (Sh 1), Waste Processing System

5.4 D-175043, Spent Fuel Pool Cooling System

6.0 Records

QA Record (X)	Non-QA Record (X)	Record Generated	Retention Time	R-Type
X		FNP-1-SOP-8.0	Life of plant	HH6.051

APPENDIX 1

FEED AND BLEED OF ACCUMULATOR 1A
TO RAISE BORON CONCENTRATION > 2300 PPM

Performed by: _____ Date _____

Reviewed by: _____ Date _____

This appendix consists of 4 pages

APPENDIX 1
FEED AND BLEED OF ACCUMULATOR 1A
TO RAISE BORON CONCENTRATION > 2300 PPM
(Page 1 of 4)

1.0 Purpose

This appendix is written to address in-leakage into 1A accumulator from the RCS and the associated concern for a reduction in boron concentration.

2.0 Precautions and Limitations

2.1 Utilizing this method of Feed and Bleed, reactor coolant will backfill the accumulator discharge line up to the accumulator test line connection.

2.2 A 1% increase in accumulator level = 8.3 gallons.

2.3 Sample flushes should be minimized to only that required to obtain sample when sampling an accumulator that has in-leakage to prevent accumulator from filling with RCS water.

2.4 Do not use extended sampling as method to drain accumulators as this would allow the accumulator to slowly fill with RCS water and dilute accumulator boron concentration.

2.5 Tech Specs require the accumulator be sampled within 6 hours after each solution volume increase of ≥ 1% of tank volume (approximately 12% increase in level).

3.0 Initial Conditions

3.1 The version of this procedure has been verified to be the current version. (OR 1-98-498) _____

3.2 The procedure has been verified to be the correct unit for the task. (OR 1-98-498) _____

APPENDIX 1
FEED AND BLEED OF ACCUMULATOR 1A
TO RAISE BORON CONCENTRATION > 2300 PPM
(Page 2 of 4)

4.0 Instructions

4.1 **Record** initial Accumulator 1A boron concentration. _____

Boron concentration _____ ppm

CAUTIONS

Accumulator level must be maintained between 35% and 55%; the intent of this appendix is to finish the feed and bleed at approximately 40%.

Accumulator boron concentration must be maintained between 2200 and 2500 ppm; the intent of this appendix is to raise accumulator boron concentration > 2300 ppm.

4.2 Aligning Accumulator 1A for Filling

4.2.1 **Verify** HYDRO TEST PUMP SEAL OVERFLOW ISO, Q1E21V083 (1-CVC-V-8979) OPEN. _____

4.2.2 **Open** HYDRO TEST PUMP SUCT, Q1E21V028 (1-CVC-V-8932). _____

4.2.3 **Set** HYDRO TEST PUMP DISCH CONT VLV, HIK 947, to OPEN. _____

4.2.4 **Verify** ACCUM N2 SUPP ISO, Q1E21HV8880 CLOSED. _____

4.2.5 **Start** the hydro test pump. _____

4.2.6 **Unlock** AND **open** HYDRO TEST PUMP DISCH TO ACCUM, N1E21V085 (1-CVC-V-8967). _____

4.2.7 **Open** the following valves:

- ACCUM FILL LINE ISO, Q1E21HV8860. _____
- 1A ACCUM FILL LINE ISO, Q1E21HV8878A _____

4.3 IF desired for trending purposes, THEN **notify** Chemistry to sample accumulator test line at start of feed and bleed at ACCUM TEST LINE TO RWST LOCAL SAMPLE, N1E21V008B (1-CVC-V-8962B) _____

4.3.1 **Record** the boron concentration _____ ppm

APPENDIX 1
FEED AND BLEED OF ACCUMULATOR 1A
TO RAISE BORON CONCENTRATION > 2300 PPM
(Page 3 of 4)

4.4 Aligning Accumulator 1A for Draining

4.4.1 **Open** ACCUM TEST LINE TO RWST ISO, Q1E21HV8961. _____

4.4.2 **Open** ACCUM TEST LINE TO RWST ISO, Q1E21HV8871. _____

4.4.3 **Open** 1A ACCUM TEST LINE ISO, Q1E21HV8877A to commence draining accumulator. _____

4.5 **Adjust** HYDRO TEST PUMP DISCH CONT VLV, using HIK 947 to control fill rate to match drain rate. _____

CAUTION

If accumulator 1A level exceeds 55% or decreases below 35%, then stop feed and bleed and restore level.

4.6 **Monitor** Accumulator 1A, level.

4.6.1 **Verify** that only 1A accumulator level is changing. _____

4.6.2 **Verify** all other accumulator levels remain constant. _____

CAUTION

If accumulator 1A pressure exceeds 640 psig or decreases below 610 psig, stop feed and bleed and restore pressure.

4.7 **Monitor** Accumulator 1A pressures.

4.7.1 **Verify** that 1A accumulator pressure is changing. _____

4.7.2 **Verify** all other accumulator pressures remain constant. _____

4.8 **Continue** Accumulator 1A feed and bleed for approximately 1 hour OR as specified by Shift Supervisor. _____

4.9 IF desired for trending purposes, THEN **notify** Chemistry to sample accumulator test line prior to completion of feed and bleed at ACCUM TEST LINE TO RWST LOCAL SAMPLE, N1E21V008B (1-CVC-V-8962B) _____

4.9.1 **Record** boron concentration _____ ppm.

4.10 WHEN Accumulator 1A feed AND bleed is complete, THEN **adjust** HYDRO TEST PUMP DISCH CONT VLV, HIK 947 to open. _____

APPENDIX 1
FEED AND BLEED OF ACCUMULATOR 1A
TO RAISE BORON CONCENTRATION > 2300 PPM
(Page 4 of 4)

4.11 **Secure** Accumulator 1A draining as follows:

4.11.1 **Close** the following valves:

- 1A ACCUM TEST LINE ISO, Q1E21HV8877A. _____
- ACCUM TEST LINE TO RWST ISO, Q1E21HV8961. _____
- ACCUM TEST LINE TO RWST ISO, Q1E21HV8871. _____

4.12 **Secure** Accumulator 1A filling as follows:

4.12.1 **Stop** the hydro test pump. _____

4.12.2 **Close** the following valves:

- 1A ACCUM FILL LINE ISO, Q1E21HV8878A. _____
- ACCUM FILL LINE ISO, Q1E21HV8860. _____
- HYDRO TEST PUMP SUCT, Q1E21V028(1-CVC-V-8932) _____

4.12.3 **Lock closed** HYDRO TEST PUMP DISCH TO ACCUM, N1E21V085 (1-CVC-V-8967). _____

4.12.4 **Verify** the following valves CLOSED:

- 1A ACCUM N2 SUPP/VT ISO, Q1E21HV8875A. _____
- ACCUM N2 VENT, HIK 936(Q1G21V092). _____

4.12.5 **Verify** HYDRO TEST PUMP DISCH CONT VLV full open using HIK 947. _____

4.13 **Notify** Chemistry to sample Accumulator 1A for boron concentration AND **record** boron concentration. _____

Boron concentration _____ ppm.

4.14 IF boron concentration < 2300 ppm, THEN **perform** additional feed AND bleeds. _____

APPENDIX 2

FEED AND BLEED OF ACCUMULATOR 1B
TO RAISE BORON CONCENTRATION > 2300 PPM

Performed by: _____ Date _____

Reviewed by: _____ Date _____

This appendix consists of 4 pages

APPENDIX 2
FEED AND BLEED OF ACCUMULATOR 1B
TO RAISE BORON CONCENTRATION > 2300 PPM
(Page 1 of 4)

1.0 Purpose

This appendix is written to address in-leakage into 1B accumulator from the RCS and the associated concern for a reduction in boron concentration.

2.0 Precautions and Limitations

2.1 Utilizing this method of Feed and Bleed, reactor coolant will backfill the accumulator discharge line up to the accumulator test line connection.

2.2 A 1% increase in accumulator level = 8.3 gallons.

2.3 Sample flushes should be minimized to only that required to obtain sample when sampling an accumulator that has in-leakage to prevent accumulator from filling with RCS water.

2.4 Do not use extended sampling as method to drain accumulators as this would allow the accumulator to slowly fill with RCS water and dilute accumulator boron concentration.

2.5 Tech Specs require the accumulator be sampled within 6 hours after each solution volume increase of ≥ 1% of tank volume (approximately 12% increase in level).

3.0 Initial Conditions

3.1 The version of this procedure has been verified to be the current version. (OR 1-98-498) _____

3.2 The procedure has been verified to be the correct unit for the task. (OR 1-98-498) _____

APPENDIX 2
FEED AND BLEED OF ACCUMULATOR 1B
TO RAISE BORON CONCENTRATION > 2300 PPM
(Page 2 of 4)

4.0 Instructions

4.1 **Record** initial Accumulator 1B boron concentration. _____

Boron Concentration _____ ppm

CAUTIONS

Accumulator level must be maintained between 35% and 55%; the intent of this appendix is to finish the feed and bleed at approximately 40%.

Accumulator boron concentration must be maintained between 2200 and 2500 ppm; the intent of this appendix is to raise accumulator boron concentration > 2300 ppm.

4.2 Aligning Accumulator 1B for Filling

4.2.1 **Verify** HYDRO TEST PUMP SEAL OVERFLOW ISO, Q1E21V083 (1-CVC-V-8979) OPEN. _____

4.2.2 **Open** HYDRO TEST PUMP SUCT, Q1E21V028 (1-CVC-V-8932). _____

4.2.3 **Set** HYDRO TEST PUMP DISCH CONT VLV, HIK 947, to OPEN. _____

4.2.4 **Verify** ACCUM N2 SUPP ISO, Q1E21HV8880 CLOSED. _____

4.2.5 **Start** the hydro test pump. _____

4.2.6 **Unlock** AND **open** HYDRO TEST PUMP DISCH TO ACCUM, N1E21V085 (1-CVC-V-8967). _____

4.2.7 **Open** the following valves: _____

- ACCUM FILL LINE ISO, Q1E21HV8860. _____
- 1B ACCUM FILL LINE ISO, Q1E21HV8878B _____

4.3 IF desired for trending purposes, THEN have Chemistry **sample** accumulator test line at start of feed and bleed at ACCUM TEST LINE TO RWST LOCAL SAMPLE, N1E21V008B (1-CVC-V-8962B) _____

4.3.1 **Record** the boron concentration _____ ppm

APPENDIX 2
FEED AND BLEED OF ACCUMULATOR 1B
TO RAISE BORON CONCENTRATION > 2300 PPM
(Page 3 of 4)

4.4 Aligning Accumulator 1B for Draining

4.4.1 **Open** ACCUM TEST LINE TO RWST ISO, Q1E21HV8961. _____

4.4.2 **Open** ACCUM TEST LINE TO RWST ISO, Q1E21HV8871. _____

4.4.3 **Open** 1B ACCUM TEST LINE ISO, Q1E21HV8877B to commence draining accumulator. _____

4.5 **Adjust** HYDRO TEST PUMP DISCH CONT VLV, using HIK 947 to control fill rate to match drain rate. _____

CAUTION

If accumulator 1B level exceeds 55% or decreases below 35%, stop feed and bleed and restore level.

4.6 **Monitor** Accumulator 1B level.

4.6.1 **Verify** that only 1B accumulator level is changing. _____

4.6.2 **Verify** all other accumulator levels remain constant. _____

CAUTION

If accumulator 1B pressure exceeds 640 psig or decreases below 610 psig, stop feed and bleed and restore pressure.

4.7 **Monitor** Accumulator 1B pressures.

4.7.1 **Verify** that 1B accumulator pressure is changing. _____

4.7.2 **Verify** all other accumulator pressures remain constant. _____

4.8 **Continue** Accumulator 1B feed and bleed for approximately 1 hour or as specified by Shift Supervisor. _____

4.9 IF desired for trending purposes, THEN **notify** Chemistry to sample accumulator test line prior to completion of feed and bleed at ACCUM TEST LINE TO RWST LOCAL SAMPLE, N1E21V008B (1-CVC-V-8962B) _____

4.9.1 **Record** boron concentration _____ ppm.

4.10 WHEN Accumulator 1B feed and bleed is complete, THEN **adjust** HYDRO TEST PUMP DISCH CONT VLV, HIK 947 to open. _____

APPENDIX 2
FEED AND BLEED OF ACCUMULATOR 1B
TO RAISE BORON CONCENTRATION > 2300 PPM
(Page 4 of 4)

4.11 **Secure** Accumulator 1B draining as follows:

4.11.1 **Close** the following valves:

- 1B ACCUM TEST LINE ISO, Q1E21HV8877B. _____
- ACCUM TEST LINE TO RWST ISO, Q1E21HV8961. _____
- ACCUM TEST LINE TO RWST ISO, Q1E21HV8871. _____

4.12 **Secure** Accumulator 1B filling as follows:

4.12.1 **Stop** the hydro test pump. _____

4.12.2 **Close** the following valves:

- 1B ACCUM FILL LINE ISO, Q1E21HV8878B. _____
- ACCUM FILL LINE ISO, Q1E21HV8860. _____
- HYDRO TEST PUMP SUCT Q1E21V028 (1-CVC-V-8932) _____

4.12.3 **Lock closed** HYDRO TEST PUMP DISCH TO ACCUM, N1E21V085 (1-CVC-V-8967). _____

4.12.4 **Verify** the following valves CLOSED:

- 1B ACCUM N2 SUPP/VT ISO, Q1E21HV8875B. _____
- ACCUM N2 VENT, HIK 936(Q1G21V092). _____

4.12.5 **Verify** HYDRO TEST PUMP DISCH CONT VLV full open using HIK 947. _____

4.13 **Notify** Chemistry to sample Accumulator 1B for boron concentration AND **record** boron concentration. _____

Boron concentration _____ ppm.

4.14 IF boron concentration < 2300 ppm, THEN **perform** additional feed and bleeds. _____

APPENDIX 3

FEED AND BLEED OF ACCUMULATOR 1C
TO RAISE BORON CONCENTRATION > 2300 PPM

Performed by: _____ Date _____

Reviewed by: _____ Date _____

This appendix consists of 4 pages

APPENDIX 3
FEED AND BLEED OF ACCUMULATOR 1C
TO RAISE BORON CONCENTRATION > 2300 PPM
(Page 1 of 4)

1.0 Purpose

This appendix is written to address in-leakage into 1C accumulator from the RCS and the associated concern for a reduction in boron concentration.

2.0 Precautions and Limitations

2.1 Utilizing this method of Feed and Bleed, reactor coolant will backfill the accumulator discharge line up to the accumulator test line connection.

2.2 A 1% increase in accumulator level = 8.3 gallons.

2.3 Sample flushes should be minimized to only that required to obtain sample when sampling an accumulator that has in-leakage to prevent accumulator from filling with RCS water.

2.4 Do not use extended sampling as method to drain accumulators as this would allow the accumulator to slowly fill with RCS water and dilute accumulator boron concentration.

2.5 Tech Specs require the accumulator be sampled within 6 hours after each solution volume increase of ≥ 1% of tank volume (approximately 12% increase in level).

3.0 Initial Conditions

3.1 The version of this procedure has been verified to be the current version. (OR 1-98-498) _____

3.2 The procedure has been verified to be the correct unit for the task. (OR 1-98-498) _____

APPENDIX 3
FEED AND BLEED OF ACCUMULATOR 1C
TO RAISE BORON CONCENTRATION > 2300 PPM
(Page 2 of 4)

4.0 Instructions

4.1 **Record** initial Accumulator 1C boron concentration. _____

Boron concentration _____ ppm

CAUTIONS

Accumulator level must be maintained between 35% and 55%; the intent of this appendix is to finish the feed and bleed at approximately 40%.

Accumulator boron concentration must be maintained between 2200 and 2500 ppm; the intent of this appendix is to raise accumulator boron concentration > 2300 ppm.

4.2 Aligning Accumulator 1C for Filling

4.2.1 **Verify** HYDRO TEST PUMP SEAL OVERFLOW ISO, Q1E21V083 (1-CVC-V-8979) OPEN. _____

4.2.2 **Open** HYDRO TEST PUMP SUCT, Q1E21V028 (1-CVC-V-8932). _____

4.2.3 **Set** HYDRO TEST PUMP DISCH CONT VLV, HIK 947, to OPEN. _____

4.2.4 **Verify** ACCUM N2 SUPP ISO, Q1E21HV8880 CLOSED. _____

4.2.5 **Start** the hydro test pump. _____

4.2.6 **Unlock** AND **open** HYDRO TEST PUMP DISCH TO ACCUM, N1E21V085 (1-CVC-V-8967). _____

4.2.7 **Open** the following valves:

- ACCUM FILL LINE ISO, Q1E21HV8860. _____
- 1C ACCUM FILL LINE ISO, Q1E21HV8878C _____

4.3 IF desired for trending purposes, THEN **notify** Chemistry to sample accumulator test line at start of feed and bleed at ACCUM TEST LINE TO RWST LOCAL SAMPLE, N1E21V008B (1-CVC-V-8962B) _____

4.3.1 **Record** the boron concentration _____ ppm

APPENDIX 3
FEED AND BLEED OF ACCUMULATOR 1C
TO RAISE BORON CONCENTRATION > 2300 PPM
(Page 3 of 4)

4.4 Aligning Accumulator 1C for Draining

4.4.1 **Open** ACCUM TEST LINE TO RWST ISO, Q1E21HV8961. _____

4.4.2 **Open** ACCUM TEST LINE TO RWST ISO, Q1E21HV8871. _____

4.4.3 **Open** 1C ACCUM TEST LINE ISO, Q1E21HV8877C to commence draining accumulator. _____

4.5 **Adjust** HYDRO TEST PUMP DISCH CONT VLV, using HIK 947 to control fill rate to match drain rate. _____

CAUTION

If accumulator 1C level exceeds 55% or decreases below 35%, then stop feed and bleed and restore level.

4.6 **Monitor** Accumulator 1C level.

4.6.1 **Verify** that only 1C accumulator level is changing. _____

4.6.2 **Verify** all other accumulator levels remain constant. _____

CAUTION

If accumulator 1C pressure exceeds 640 psig or decreases below 610 psig, then stop feed and bleed and restore pressure.

4.7 **Monitor** Accumulator 1C pressures.

4.7.1 **Verify** that 1C accumulator pressure is changing. _____

4.7.2 **Verify** all other accumulator pressures remain constant. _____

4.8 **Continue** Accumulator 1C feed and bleed for approximately 1 hour OR as specified by Shift Supervisor. _____

4.9 IF desired for trending purposes, THEN **notify** Chemistry to sample accumulator test line prior to completion of feed and bleed at ACCUM TEST LINE TO RWST LOCAL SAMPLE, N1E21V008B (1-CVC-V-8962B) _____

4.9.1 **Record** boron concentration _____ ppm.

4.10 WHEN Accumulator 1C feed and bleed is complete, THEN **adjust** HYDRO TEST PUMP DISCH CONT VLV, HIK 947 to OPEN. _____

APPENDIX 3
FEED AND BLEED OF ACCUMULATOR 1C
TO RAISE BORON CONCENTRATION > 2300 PPM
(Page 4 of 4)

4.11 **Secure** Accumulator 1C draining as follows:

4.11.1 **Close** the following valves:

- 1C ACCUM TEST LINE ISO, Q1E21HV8877C. _____
- ACCUM TEST LINE TO RWST ISO, Q1E21HV8961. _____
- ACCUM TEST LINE TO RWST ISO, Q1E21HV8871. _____

4.12 **Secure** Accumulator 1C filling as follows:

4.12.1 **Stop** the hydro test pump. _____

4.12.2 **Close** the following valves:

- 1C ACCUM FILL LINE ISO, Q1E21HV8878C. _____
- ACCUM FILL LINE ISO, Q1E21HV8860. _____
- HYDRO TEST PUMP SUCT, Q1E21V028 (1-CVC-V-8932) _____

4.12.3 **Lock** HYDRO TEST PUMP DISCH TO ACCUM, N1E21V085 (1-CVC-V-8967) closed. _____

4.12.4 **Verify** the following valves CLOSED:

- 1C ACCUM N2 SUPP/VT ISO, Q1E21HV8875C. _____
- ACCUM N2 VENT, HIK 936(Q1G21V092). _____

4.12.5 **Verify** HYDRO TEST PUMP DISCH CONT VLV full open using HIK 947. _____

4.13 **Notify** Chemistry to sample Accumulator 1C for boron concentration. AND **record** boron concentration. _____

Boron concentration _____ ppm.

4.14 IF boron concentration < 2300 ppm, THEN **perform** additional feed and bleeds. _____

APPENDIX 4

LEAKAGE ASSESSMENT OF NITROGEN HEADER IN CTMT DURING MODES 5, 6 OR DEFUELED

Performed by: _____ Date _____

Reviewed by: _____ Date _____

This appendix consists of 3 pages

APPENDIX 4
LEAKAGE ASSESSMENT OF NITROGEN HEADER
IN CTMT DURING MODES 5, 6 OR DEFUELED
(Page 1 of 3)

1.0 Purpose

This appendix is written to perform leak assessment of nitrogen header inside CTMT to determine possible sources of CTMT air in leakage.

2.0 Precaution and Limitations

None.

3.0 Initial Conditions

3.1 The version of this procedure has been verified to be the current version. (OR 1-98-498) _____

3.2 The procedure has been verified to be the correct unit for the task. (OR 1-98-498) _____

APPENDIX 4
LEAKAGE ASSESSMENT OF NITROGEN HEADER
IN CTMT DURING MODES 5, 6 OR DEFUELED
(Page 2 of 3)

4.0 Instructions

4.1 **Verify** the following valves CLOSED:

4.1.1 Accumulator Nitrogen Vent Q1E21HCV936-(HIK 936) (MCB). _____

4.1.2 1A ACCUM N2 SUPP/VT ISO Q1E21HV8875A (MCB). _____

4.1.3 1B ACCUM N2 SUPP/VT ISO Q1E21HV8875B (MCB). _____

4.1.4 1C ACCUM N2 SUPP/VT ISO Q1E21HV8875C (MCB). _____

4.2 **Verify** ACCUM N2 SUPPLY ROOT (ACTIVE BANK) N1E21V002A OPEN. _____

4.3 **Open** the following valves located on the PRIP:

4.3.1 ACCUM N2 SUPPLY ISOLATION N1E21HV3938A _____

4.3.2 ACCUM N2 SUPPLY ISOLATION N1E21HV3938B _____

4.4 **Open** Accumulator N_2 Supply ISO Q1E21HV8880 (MCB) _____

4.5 Slowly **adjust** N_2 Supply to Accumulator Regulator N1E21V013 to approximately 650 psig. _____

4.6 **Perform** leak checks on the following components:

- Accum Nitrogen Vent Q1E21HCV936 (CTMT 129') _____
- N_2 Supply HDR to Accum Relief Valve Q1E21V060 (CTMT 129') _____
- N_2 Supply HDR to Accum. Test Conn. Q1E21V420A (CTMT 126') _____
- N_2 Supply HDR to Accum Test Conn. ISO Q1E21V420B (CTMT 126') _____
- N_2 Supply HDR to Accum Test Conn. N1E21V304A (CTMT 129') _____
- N_2 Supply HDR to Accum. Test Conn. ISO N1E21V304B (CTMT 129') _____

4.7 **Generate** work orders to have air leaks/components repaired OR replaced. _____

APPENDIX 4
LEAKAGE ASSESSMENT OF NITROGEN HEADER
IN CTMT DURING MODES 5, 6 OR DEFUELED
(Page 3 of 3)

4.8 **Close** the following valves located on the PRIP:

4.8.1 ACCUM N2 SUPPLY ISOLATION N1E21HV3938A _____

4.8.2 ACCUM N2 SUPPLY ISOLATION N1E21HV3938B _____

4.9 **Close** accumulator N_2 supply ISO Q1E21HV8880 (MCB) _____

4.10 Slowly **adjust** N_2 Supply to Accumulator Regulator N1E21V013 to approximately 15 psig. _____

4.11 **Vent** N_2 Hdr in CTMT by opening Accumulator Nitrogen Vent Q1E21HCV936-(HIK 936) (MCB) _____

4.12 **Verify** Accumulator Nitrogen Vent Q1E21HCV936-(HIK 936) CLOSED (MCB) _____

jpm b

TITLE: Perform The Required Actions For Cold Leg Recirculation

PROGRAM APPLICABLE: SOT ___ SOCT ___ OLT _X_ LOCT

ACCEPTABLE EVALUATION METHOD: _X_ PERFORM ___ SIMULATE ___ DISCUSS

EVALUATION LOCATION: _X_ SIMULATOR ___ CONTROL ROOM ___ PLANT

PROJECTED TIME: _15 MIN_ SIMULATOR IC NUMBER: _IC-212 (Base -151)_

ALTERNATE PATH _X_ TIME CRITICAL ___ PRA ___

JPM DIRECTIONS:

1. Examinee will obtain all references from the simulator.
2. The actions of this task are intended to be performed on an Active Simulator in which the examinee may diagnose the correctness of system response to his/her actions and respond to any abnormal conditions which may arise.
3. Provide student with HANDOUT.
4. Allow student time to review control board.
5. Instructor will be provided to address alarms not related to evaluated task.

TASK STANDARD: Upon successful completion of this JPM, the examinee will:

1. Perform the Required Actions For Cold Leg Recirculation.

Examinee:		
Overall JPM Performance:	**Satisfactory** ☐	**Unsatisfactory** ☐
Evaluator Comments (attach additional sheets if necessary)		

EXAMINER: _____

EVENT DESCRIPTION	ACTION	DETAILS
Reset into IC-212		
Acknowledge computer alarms		
Run / Freeze Simulator		
Acknowledge Alarms		
Turn Horns ON		
Run / Freeze Simulator		

CONDITIONS

When I tell you to begin, you are to **PERFORM THE REQUIRED ACTIONS FOR COLD LEG RECIRCULATION**. The conditions under which this task is to be performed are:

a. A LBLOCA has occurred.
b. ESP-1.3, Transfer to Cold Leg Recirc, has been entered and all steps through Step 6 have been completed.
c. Recirculation Disconnects are Closed.
d. You are directed by the Shift Supervisor to transfer to cold leg recirculation starting at Step 7 of ESP-1.3.
e. A pre-job brief is not required.

EVALUATION CHECKLIST

	ELEMENTS:	STANDARDS:	RESULTS: (CIRCLE)
	_____ START TIME		
1.	7.1 Check large break LOCA has occurred as indicated by accumulators discharged.	Observes LI-920 & 922, 924 & 926, 928 & 930, TK1, TK2, TK3 ACCUMULATOR LVL indicates 0 percent.	S / U
2.	7.2 Check containment sump level - GREATER THAN 3.4 ft {3.8 ft}.	LI-3594A or LR-3594B checked. Observes sump level ~ 4 ft.	S / U
3.	7.3 Proceed to step 7.5	Proceeds to step 7.5	S / U
4.	7.5 Verify recirculation valve disconnects - CLOSED USING ATTACHMENT 1.	This is part of the initial conditions. May refer to Attachment 1. Observes all white lights lit.	S / U
*5.	7.6 Stop both RHR PUMPs.	1A and 1B RHR pump handswitches taken to stop. Observes 1A & 1B RHR pump Amps indicate '0', Both pumps green lights lit and red lights NOT lit.	S / U

NOTE: THE FOLLOWING ELEMENT IS THE START OF THE ALTERNATE PATH IN THE RNO COLUMN.

EVALUATION CHECKLIST

	ELEMENTS:	STANDARDS:	RESULTS: (CIRCLE)
6.	7.7 Close RWST TO 1A RHR PUMP Q1E11MOV8809A.	MOV-8809A handswitch taken to closed. Observes BOTH lights are out.	S / U
7.	7.7 (RNO) Perform the following: 7.7.1 Stop the running A train CHG PUMP.	Takes 1A Charging pump HS to stop. Observes 1A CHG pump Amps indicate '0', pump green light lit and red light NOT lit.	S / U
Note: Step 7.7.2 is not critical.			
	7.7.2 Proceed to step 7.12	Proceeds to step 7.12	S / U
*8.	7.12 Close RWST TO 1B RHR PUMP Q1E11MOV8809B.	HS for MOV-8809B taken to closed. Observes green light lit, red light out.	S / U
*9.	7.13 Align CTMT sump to 1B RHR PUMP. CTMT SUMP TO 1B RHR PUMP [] Q1E11MOV8811B open [] Q1E11MOV8812B open	HS for MOV-8811B and MOV-8812B, taken to open. Observes red lights lit, green lights out.	S / U
*10.	7.14 Close RHR to RCS HOT LEGS XCON Q1E11MOV8887B.	HS for MOV-8887B taken to closed. Observes green light lit, red light out.	S / U
*11.	7.15 Start 1B RHR PUMP. [] 1B amps > 0	HS for 1B RHR PMP taken to start. Observes pump Amp meter indicates amps, pump breaker red light lit, green light out.	S / U
12.	7.16 Verify B Train LHSI flow - STABLE. 1B RHR HDR FLOW [] FI 605B	FI-605B checked. Observes FI-605B stable.	S / U

EVALUATION CHECKLIST

	ELEMENTS:	STANDARDS:	RESULTS: (CIRCLE)
13.	7.17 Verify at least one train of RHR in operation providing recirculation flow.	Checks that B train RHR is providing recirculation flow. Observes 1B RHR pump running and providing flow.	S / U
14.	7.18 Verify charging pump miniflow valves - CLOSED. 1A(1B,1C) CHG PUMP MINIFLOW ISO [] Q1E21MOV8109A [] Q1E21MOV8109B [] Q1E21MOV8109C CHG PUMP MINIFLOW ISO [] Q1E21MOV8106	Indications for MOVs 8109A/B/C and 8106 checked. Observes green lights are lit and red lights are out.	S / U
15.	7.19 Verify seal return flow valves - CLOSED. RCP SEAL WTR RTN ISO [] Q1E21MOV8100 closed [] Q1E21MOV8112 closed	Indications for seal return flow valves MOV 8100 and 8112 checked. Observes MOV 8100 and 8112 indications green lights lit, red lights NOT lit.	S / U
16.	7.20 IF 1A RHR PUMP started, THEN align charging pump suction header isolation valves based on 1B charging pump status.	Observes 1A Charging pump breaker position indicators green lights lit, red lights out. Proceeds to step 7.25	S / U

Note: Closing MOV-8131A & B is the critical portion of this step.

*17.	7.25 IF 1B RHR PUMP started, THEN align charging pump suction header isolation valves based on 1B charging pump status.	Checks position indication for CHG PMP SUCT HDR ISO VLV MOV-8130A and B. Observes valve position indicators red lights lit, green lights NOT lit.	S / U
.		HS for MOV-8131A and B taken to close. Observes green lights lit red lights out.	S / U

EVALUATION CHECKLIST

	ELEMENTS:	STANDARDS:	RESULTS: (CIRCLE)
*18.	7.26 Open RHR supply to B train charging pump suction. 1B RHR HX CHG PUMP. TO CHG PUMP SUCT [] Q1E11MOV8706	HS for MOV-8706B taken to open. Observes red light lit, green light out.	S / U
19.	7.27 Verify B train CHG PUMP - started.	Observes 1B Charging pump red light lit and Amps > 0.	S / U
20.	7.28 Verify VCT level is > 5%.	Observes LI-115/112 indicates > 5% level.	S / U
*21.	7.29 Close B train RWST to charging pump header valve. RWST TO CHG PUMP [] Q1E21LCV115D	HS for LCV-115D taken to close. Observes green light lit, red light out.	S / U
22.	7.30 Check one CHG PUMP in each train – STARTED. [] A train (1A or 1B) amps > 0 [] B train (1C or 1B) amps > 0	Observes 1C pump Amps > 0, red light is lit, green light NOT lit. Observes 1A Charging pump green light lit, red light out.	S / U
*23.	7.30.1 (RNO) Open charging pump recirculation to RCS cold legs valve. CHG PUMP RECIRC TO RCS COLD LEGS [] Q1E21MOV8885	HS for MOV-8885 handswitch taken to open. Observes valve position indicator red light lit, green light NOT lit, FI-940 HAS flow and FI-943 does NOT have flow.	S / U
*24.	7.30.2 (RNO) Close HHSI isolation valves. HHSI TO RCS CL ISO [] Q1E21MOV8803A [] Q1E21MOV8803B	HS for MOV-8803A and MOV-8803B taken to close. Observes green lights lit, red lights out. Proceeds to step 7.32	S / U

EVALUATION CHECKLIST

ELEMENTS:	STANDARDS:	RESULTS: (CIRCLE)
Note: Closing MOV-8131A & B is the critical portion of this step.		
*25. 7.32 Align charging pump discharge header isolation valves based on 1B charging pump status.	Checks open MOV-8132A and B. Observes valve position indicators red lights lit, green lights NOT lit.	S / U
	HS for MOV-8133A and B taken to close. Observes valve position indicators green lights lit, red light out.	S / U
26. 7.33 Verify SI flow - STABLE	Flow is checked. Observes flow indicated on FI-940, 'B' TRAIN RECIRC FLOW and FI-605B 'B' train RHR HDR flow. NO flow indicated on FI-943, A TRAIN RECIRC FLOW and FI-605A, 'A' train RHR HDR flow.	S / U

_____ STOP TIME

Terminate when STEP 7 is complete: SI flow is determined to be stable.

*** CRITICAL ELEMENTS:** Critical Elements are denoted with an Asterisk (*) preceding the element number.

GENERAL REFERENCES:

1. FNP-1-ESP-1.3, ver 22
2. K/As: 011EA1.11 - 4.2 / 4.2
   011EA1.13 – 4.1 / 4.2

GENERAL TOOLS AND EQUIPMENT:

1. Copy of ESP-1.3, ver 22

Critical ELEMENT justification:

1 – 4	Not critical - No actions required
5	Critical – Task completion. If left running, damage could occur when 1B RHR suction is isolated.
6	Not critical – valve will not close
7	Not critical – Pump will still have suction source.
8-10	Critical – Task completion. Required line up for recirculation.
11	Critical – Task completion. Provide water source for recirculation.
12 -16	Not critical. No actions required.
17	Critical – Task completion. Provides train separation
18	Critical – Task completion. Provides suction source for Charging pump
19-20	Not critical. No actions required.
21	Critical – Task completion. System alignment.
22	Not critical. No actions required.
23-24	Critical – Task completion. System alignment for recirculation flow.
25	Critical – Task completion. Provides train separation
26	Not critical. No actions required.

COMMENTS:

jpm b

CONDITIONS

When I tell you to begin, you are to **PERFORM THE REQUIRED ACTIONS FOR COLD LEG RECIRCULATION**. The conditions under which this task is to be performed are:

a. A LBLOCA has occurred.
b. ESP-1.3, Transfer to Cold Leg Recirc, has been entered and all steps through Step 6 have been completed.
c. Recirculation Disconnects are Closed.
d. You are directed by the Shift Supervisor to transfer to cold leg recirculation starting at Step 7 of ESP-1.3.
e. A pre-job brief is not required.

UNIT 1

FARLEY NUCLEAR PLANT

EVENT SPECIFIC PROCEDURE

FNP-1-ESP-1.3

TRANSFER TO COLD LEG RECIRCULATION

PROCEDURE USAGE REQUIREMENTS-per FNP-0-AP-6	SECTIONS
Continuous Use	**ALL**
Reference Use	
Information Use	

SAFETY RELATED

Approved:

David L. Reed (for)
Operations Manager

Date Issued: 02/10/11

Table of Contents

Procedure Contains	Number of Pages
Body	19
Attachment 1	3

A. Purpose

This procedure provides the necessary instructions for transferring the safety injection system and containment spray system to the recirculation mode.

B. Symptoms or Entry Conditions

I. This procedure is entered when RWST level is less than 12.5 ft; from the following:

a. FNP-1-EEP-1, LOSS OF REACTOR OR SECONDARY COOLANT, step 15

b. FNP-1-ESP-1.2, POST LOCA COOLDOWN AND DEPRESSURIZATION, step 1

c. FNP-1-ECP-2.1, UNCONTROLLED DEPRESSURIZATION OF ALL STEAM GENERATORS, step 13

d. FNP-1-FRP-C.2, RESPONSE TO DEGRADED CORE COOLING, step 1

e. FNP-1-FRP-C.3, RESPONSE TO SATURATED CORE COOLING, step 1

f. FNP-1-FRP-H.1, RESPONSE TO LOSS OF SECONDARY HEAT SINK, step 20

g. A Foldout Page

Step	Action/Expected Response	Response NOT Obtained

****

CAUTION: To ensure that SI recirculation flow is maintained at all times, the following steps should be performed without delay.

****

****

CAUTION: No Function Restoration Procedure should be implemented until step 7 has been completed.

****

****

CAUTION: Switchover to recirculation may cause high radiation levels in the auxiliary building.

****

___ **1** **[CA] Check RWST level - GREATER THAN 4.5 ft.**

1 IF alignment for recirculation is NOT imminent, THEN stop any pump taking suction from the RWST.

CHG PUMP
[] 1A
[] 1B
[] 1C

RHR PUMP
[] 1A
[] 1B

[] CS RESET
TRN A(B) containment spray signals - RESET (Annunciator EE4 clear).

CS PUMP
[] 1A
[] 1B

Step	Action/Expected Response	Response NOT Obtained

NOTE: The intent of Step 2 is to differentiate between a steam line break event (with SI terminated and RWST drain down only from containment spray operation) and a loss of reactor coolant event (RWST drain down from one or more ECCS pumps).

___ **2** **Check SI in service.**

- Check HHSI flow - GREATER THAN 0 gpm.

  A TRN
  HHSI FLOW
  [] FI 943

  OR

- Check any RHR PUMP - STARTED IN SI MODE.

Started RHR PUMP	1A	1B
RWST TO 1A(1B) RHR PUMP Q1E11MOV	[] 8809A open	[] 8809B open
1C(1A) RCS LOOP TO 1A(1B) RHR PUMP Q2E11MOV	[] 8701A closed [] 8701B closed	[] 8702A closed [] 8702B closed

2 Perform the following.

2.1 Reset containment sump to RHR valve switches.

CTMT SUMP TO RHR PUMP RESET
[] A TRN
[] B TRN

2.2 Proceed to step 8.

Step	Action/Expected Response	Response NOT Obtained
___ 3	**Verify SI - RESET.** [] MLB-1 1-1 not lit (A TRN) [] MLB-1 11-1 not lit (B TRN)	3 Perform the following: 3.1 IF any train will NOT reset using the MCB SI RESET pushbuttons, THEN place the affected train S821 RESET switch to RESET. (SSPS TEST CAB.) 3.2 IF a failure exists in SSPS such that SI cannot be reset, THEN reset SI using FNP-1-SOP-40.0, RESPONSE TO INADVERTENT SI AND INABILITY TO RESET OR BLOCK SI, Appendix 2.
___ 4	**Verify at least one train of PRF in operation using FNP-1-SOP-60.0, PENETRATION ROOM FILTRATION SYSTEM in conjunction with the remaining steps of this procedure.**	
___ 5	**Check CCW to RHR heat exchangers MOVs - OPEN.** CCW TO 1A(1B) RHR HX [] Q1P17MOV3185A open [] Q1P17MOV3185B open	5 Open any closed CCW to RHR heat exchanger valve(s) AND continue with this procedure while valves stroke open. CCW TO 1A(1B) RHR HX [] Q1P17MOV3185A open [] Q1P17MOV3185B open
___ 6	**Establish only one CHG PUMP in each train - RUNNING.** [] A Train (1A or 1B) amps > 0 [] B Train (1C or 1B) amps > 0	

Step	Action/Expected Response	Response NOT Obtained

****

CAUTION: Pump damage will occur if a charging pump or RHR pump is started in a train in which a flow path from the containment sump to the RCS cannot be established or maintained.

****

___ **7 Align ECCS for cold leg recirculation.**

7.1 Check large break LOCA has occurred as indicated by accumulators discharged.

7.1 Proceed to step 7.4.

7.2 Check containment sump level - GREATER THAN 3.4 ft {3.8 ft}.

CTMT SUMP LVL
[] LI 3594A

POST ACCIDENT CTMT WTR LVL
[] LR 3594B

7.2 IF both containment sump level indications less than 3.4 ft {3.8 ft}, THEN go to FNP-1-ECP-1.1, LOSS OF EMERGENCY COOLANT RECIRCULATION.

7.3 Proceed to step 7.5.

7.4 Check containment sump level - GREATER THAN 2.5 ft {2.9 ft}.

CTMT SUMP LVL
[] LI 3594A

POST ACCIDENT CTMT WTR LVL
[] LR 3594B

7.4 IF both containment sump level indications less than 2.5 ft {2.9 ft}, THEN go to FNP-1-ECP-1.1, LOSS OF EMERGENCY COOLANT RECIRCULATION.

7.5 Verify recirculation valve disconnects - CLOSED USING ATTACHMENT 1.

7.6 Stop both RHR PUMPs.

Step 7 continued on next page.

Step	Action/Expected Response	Response NOT Obtained
7.7	Close RWST TO 1A RHR PUMP Q1E11MOV8809A.	7.7 Perform the following. 7.7.1 Stop the running A train CHG PUMP. 7.7.2 Proceed to step 7.12.
7.8	Align CTMT sump to 1A RHR PUMP. CTMT SUMP TO 1A RHR PUMP [] Q1E11MOV8811A open [] Q1E11MOV8812A open	7.8 Perform the following. 7.8.1 Stop the running A train CHG PUMP. 7.8.2 Proceed to step 7.12.
7.9	Close RHR to RCS HOT LEGS XCON Q1E11MOV8887A.	
7.10	Start 1A RHR PUMP. RHR PUMP [] 1A amps > 0	7.10 Perform the following. 7.10.1 Stop the running A train CHG PUMP. 7.10.2 Proceed to step 7.12.
7.11	Verify A Train LHSI flow - STABLE. 1A RHR HDR FLOW [] FI 605A	
7.12	Close RWST TO 1B RHR PUMP Q1E11MOV8809B.	7.12 Perform the following. 7.12.1 Stop the running B train CHG PUMP. 7.12.2 Proceed to step 7.17.
7.13	Align CTMT sump to 1B RHR PUMP. CTMT SUMP TO 1B RHR PUMP [] Q1E11MOV8811B open [] Q1E11MOV8812B open	7.13 Perform the following. 7.13.1 Stop the running B train CHG PUMP. 7.13.2 Proceed to step 7.17.

Step 7 continued on next page.

Step	Action/Expected Response	Response NOT Obtained
7.14	Close RHR to RCS HOT LEGS XCON Q1E11MOV8887B.	
7.15	Start 1B RHR PUMP. RHR PUMP [] 1B amps > 0	7.15 Perform the following. 7.15.1 Stop the running B train CHG PUMP. 7.15.2 Proceed to step 7.17.
7.16	Verify B Train LHSI flow - STABLE. 1B RHR HDR FLOW [] FI 605B	

Step 7 continued on next page.

Step	Action/Expected Response	Response NOT Obtained
7.17	Verify at least one train of RHR in operation providing recirculation flow.	7.17 Perform the following: 7.17.1 Check A Train RHR available: • 1A RHR Pump • CTMT SUMP TO 1A RHR PUMP Q1E11MOV8811A • CTMT SUMP TO 1A RHR PUMP Q1E11MOV8812A • 1A RHR HX TO CHG PUMP SUCT Q1E11MOV8706A • CCW TO 1A RHR HX Q1P17MOV3185A 7.17.2 IF A Train RHR components available for recirculation flowpath, THEN start an A Train Charging Pump and return to step 7.8. 7.17.3 Check B Train RHR available: • 1B RHR Pump • CTMT SUMP TO 1B RHR PUMP Q1E11MOV8811B • CTMT SUMP TO 1B RHR PUMP Q1E11MOV8812B • 1B RHR HX TO CHG PUMP SUCT Q1E11MOV8706B • CCW TO 1B RHR HX Q1P17MOV3185B 7.17.4 IF B train RHR components available for recirculation flowpath, THEN start a B Train Charging Pump and return to step 7.13. 7.17.5 IF no RHR train is available, THEN check RWST level greater than 4.5 ft AND start any available charging pump aligned to the RWST.

Step 7 continued on next page.

Step	Action/Expected Response	Response NOT Obtained
		7.17.6 Go to FNP-1-ECP-1.1, LOSS OF EMERGENCY COOLANT RECIRCULATION.

****

CAUTION: The charging pumps should be stopped if RCS pressure rises to greater than their shutoff head.

****

****

CAUTION: The charging pump miniflows should NOT be reopened to satisfy miniflow criteria while the charging pump suctions are aligned to the RHR pumps.

****

7.18 Verify charging pump miniflow valves - CLOSED.

1A(1B,1C) CHG PUMP MINIFLOW ISO
[] Q1E21MOV8109A
[] Q1E21MOV8109B
[] Q1E21MOV8109C

CHG PUMP MINIFLOW ISO
[] Q1E21MOV8106

7.19 Verify seal return flow valves - CLOSED.

RCP SEAL WTR RTN ISO
[] Q1E21MOV8100 closed
[] Q1E21MOV8112 closed

Step 7 continued on next page.

Step | **Action/Expected Response** | **Response NOT Obtained**

7.20 IF 1A RHR PUMP started, THEN align charging pump suction header isolation valves based on 1B charging pump status.

1B Charging Pump Status	Aligned As A Train pump	Aligned As B Train pump	Not Available
CHG PUMP SUCTION HDR ISO Q1E21MOV	[] 8130A open [] 8130B open [] 8131A closed [] 8131B closed	[] 8130A closed [] 8130B closed [] 8131A open [] 8131B open	[] 8130A closed [] 8130B closed [] 8131A closed [] 8131B closed

7.20 IF 1A RHR PUMP NOT started, THEN perform the following.

7.20.1 Verify the A train CHG PUMP stopped.

7.20.2 Proceed to step 7.25.

7.21 Open RHR supply to A train charging pump suction.

1A RHR HX
TO CHG PUMP SUCT
[] Q1E11MOV8706A

7.21 Perform the following.

7.21.1 Stop the running A train CHG PUMP.

7.21.2 Proceed to step 7.25.

7.22 Verify A train CHG PUMP - started.

7.23 Verify VCT level - GREATER THAN 5%.

7.24 Close A train RWST to charging pump header valve.

RWST
TO CHG PUMP
[] Q1E21LCV115B

7.24 Perform the following.

7.24.1 Stop the running A train CHG PUMP.

7.24.2 Close RHR supply to A train charging pump suction.

1A RHR HX
TO CHG PUMP SUCT
[] Q1E11MOV8706A

Step 7 continued on next page.

Step	Action/Expected Response	Response NOT Obtained
7.25	IF 1B RHR PUMP started, THEN align charging pump suction header isolation valves based on 1B charging pump status.	7.25 IF 1B RHR PUMP NOT started, THEN perform the following. 7.25.1 Verify the B train CHG PUMP stopped. 7.25.2 Proceed to step 7.30.

1B Charging Pump Status	Aligned As A Train pump	Aligned As B Train pump	Not Available
CHG PUMP SUCTION HDR ISO Q1E21MOV	[] 8130A open [] 8130B open [] 8131A closed [] 8131B closed	[] 8130A closed [] 8130B closed [] 8131A open [] 8131B open	[] 8130A closed [] 8130B closed [] 8131A closed [] 8131B closed

7.26	Open RHR supply to B train charging pump suction. 1B RHR HX TO CHG PUMP SUCT [] Q1E11MOV8706B	7.26 Perform the following. 7.26.1 Stop the running B train CHG PUMP. 7.26.2 Proceed to step 7.30.
7.27	Verify B train CHG PUMP - started.	
7.28	Verify VCT level - GREATER THAN 5%.	

Step 7 continued on next page.

Step	Action/Expected Response	Response NOT Obtained
7.29	Close B train RWST to charging pump header valve. RWST TO CHG PUMP [] Q1E21LCV115D	7.29 Perform the following. 7.29.1 Stop the running B train CHG PUMP. 7.29.2 Close RHR supply to B train charging pump suction. 1B RHR HX TO CHG PUMP SUCT [] Q1E11MOV8706B 7.29.3 Proceed to step 7.30.

****

CAUTION: Injecting through 'A' train and 'B' train flowpaths simultaneously with only one charging pump running could result in pump runout conditions. Therefore, in Step 7.30 RNO the HHSI valves should be closed without delay after MOV8885 is opened.

****

7.30	Check one CHG PUMP in each train - STARTED. [] A train (1A or 1B) amps > 0 [] B train (1C or 1B) amps > 0	7.30 IF an A train CHG PUMP started, THEN proceed to step 7.32 IF NOT, establish B train injection per the following. 7.30.1 Open charging pump recirculation to RCS cold legs valve. CHG PUMP RECIRC TO RCS COLD LEGS [] Q1E21MOV8885 7.30.2 Close HHSI isolation valves. HHSI TO RCS CL ISO [] Q1E21MOV8803A [] Q1E21MOV8803B 7.30.3 Proceed to step 7.32.

Step 7 continued on next page.

Step	Action/Expected Response	Response NOT Obtained

7.31 Open charging pump recirculation to RCS cold legs valve.

CHG PUMP RECIRC TO RCS COLD LEGS
[] Q1E21MOV8885

7.32 Align charging pump discharge header isolation valves based on 1B charging pump status.

1B Charging Pump Status	Aligned As A Train pump	Aligned As B Train pump	Not Available
CHG PUMP DISCH HDR ISO Q1E21MOV	[] 8132A open [] 8132B open [] 8133A closed [] 8133B closed	[] 8132A closed [] 8132B closed [] 8133A open [] 8133B open	[] 8132A closed [] 8132B closed [] 8133A closed [] 8133B closed

7.33 Verify SI flow - STABLE.

A TRN HHSI FLOW
[] FI 943

HHSI B TRN RECIRC FLOW
[] FI 940

1A(1B) RHR HDR FLOW
[] FI 605A
[] FI 605B

7.33 IF at least one train of flow from the containment sump to the RCS can NOT be established or maintained, THEN go to FNP-1-ECP-1.1, LOSS OF EMERGENCY COOLANT RECIRCULATION.

Step	Action/Expected Response	Response NOT Obtained

****

CAUTION: Any charging pump with suction aligned to an RHR pump should be stopped prior to stopping the RHR pump.

****

****

CAUTION: Charging pump or spray pump damage will occur if suction is lost and the pump is not secured.

****

NOTE:
- Erratic pump parameters (flow, discharge pressure, amps, etc.) are indications of pump cavitation.
- Step 8 is a continuous action step which applies any time ECCS pumps are aligned to the sump.

___ **8** **Verify ECCS pumps not affected by sump blockage.**

8.1 [CA] Monitor ECCS pump suction conditions - NO INDICATION OF CAVITATION.

CHG PUMP
[] 1A
[] 1B
[] 1C

RHR PUMP
[] 1A
[] 1B

CS PUMP
[] 1A
[] 1B

8 IF both trains are affected such that at least one train of SI recirculation flow cannot be maintained, THEN go to FNP-1-ECP-1.3, LOSS OF EMERGENCY COOLANT RECIRCULATION CAUSED BY SUMP BLOCKAGE.

Step	Action/Expected Response	Response NOT Obtained

NOTE: Containment spray pumps that have been secured due to RWST level less than 4.5 ft should not be started in the following step.

___ **9 [CA] Check containment spray.- IN OPERATION.**

9.1 Check any containment spray pump - STARTED.

CS PUMP
[] 1A
[] 1B

9.1 Verify all available containment spray pumps - RUNNING.

9.2 Check containment spray flow in both trains - GREATER THAN 0 gpm.

CS FLOW
[] FI 958A
[] FI 958B

9.2 Perform the following.

9.2.1 IF RWST - GREATER THAN 4.5 ft, THEN verify containment spray pump suction aligned for injection.

RWST TO
1A(1B) CS PUMP

[] Q1E13MOV8817A open
[] Q1E13MOV8817B open

9.2.2 Verify containment spray pump discharge aligned.

CS PUMP TO SPRAY HDR ISO

[] Q1E13MOV8820A open
[] Q1E13MOV8820B open

9.2.3 IF unable to establish spray flow in a train, THEN secure containment spray pump in affected train.

[] CS RESET
TRN A(B) containment spray signals - RESET
(Annunciator EE4 clear).
[] CTMT SPRAY PUMP 1A(B) - STOPPED in affected train

Step	Action/Expected Response	Response NOT Obtained
___10	**[CA] WHEN RWST level less than 4.5 ft, THEN align containment spray for recirculation.**	
	10.1 Reset PHASE B CTMT ISO. [] MLB-3 1-1 not lit [] MLB-3 6-1 not lit	
	10.2 Open containment spray pump containment sump suction isolation valves. CTMT SUMP TO 1A(1B) CS PUMP [] Q1E13MOV8826A [] Q1E13MOV8827A [] Q1E13MOV8826B [] Q1E13MOV8827B	10.2 IF unable to open a containment sump suction isolation valve, THEN perform the following: 10.2.1 Secure containment spray pump in affected train. [] CS RESET TRN A(B) containment spray signals - RESET (Annunciator EE4 clear). [] CTMT SPRAY PUMP 1A(B) - STOPPED in affected train 10.2.2 Verify closed BOTH containment sump suction isolation valves in affected train. CTMT SUMP TO 1A CS PUMP [] Q1E13MOV8826A [] Q1E13MOV8827A CTMT SUMP TO 1B CS PUMP [] Q1E13MOV8826B [] Q1E13MOV8827B

Step 10 continued on next page.

Step	Action/Expected Response	Response NOT Obtained
10.3	Close containment spray pump RWST suction isolation valves. RWST TO 1A(1B) CS PUMP [] Q1E13MOV8817A [] Q1E13MOV8817B	10.3 IF unable to isolate RWST suction in a train, THEN perform the following: 10.3.1 Secure containment spray pump in affected train. [] CS RESET TRN A(B) containment spray signals - RESET (Annunciator EE4 clear). [] CTMT SPRAY PUMP 1A(B) - STOPPED in affected train 10.3.2 Close containment spray pump containment sump suction isolation valves in affected train. CTMT SUMP TO 1A CS PUMP [] Q1E13MOV8826A [] Q1E13MOV8827A CTMT SUMP TO 1B CS PUMP [] Q1E13MOV8826B [] Q1E13MOV8827B
10.4	WHEN containment spray aligned for recirc, THEN start containment spray pumps IF secured due to RWST level less than 4.5 ft. CS PUMP [] 1A [] 1B	
10.5	[CA] WHEN containment spray recirculation flow has been established for at least 8 hours, AND containment pressure is less than 16 psig, THEN stop both CS PUMPs.	

Step 10 continued on next page.

Step	Action/Expected Response	Response NOT Obtained

****

CAUTION: If Q1E11MOV8809A & B are not closed, any makeup to the RWST would be pumped into the RCS by the RHR pumps rather than increasing RWST level. This could result in containment flooding.

****

10.6 Makeup to the RWST as necessary.

10.6.1 Makeup to the RWST in accordance with FNP-1-SOP-2.3, CHEMICAL AND VOLUME CONTROL SYSTEM REACTOR MAKEUP CONTROL SYSTEM.

OR

10.6.2 Consult TSC staff to determine alternate method of makeup to the RWST.

___**11** **[CA] Determine criteria to be used for TRANSFER TO SIMULTANEOUS COLD AND HOT LEG RECIRCULATION requirements.**

11.1 Check FNP-1-EEP-1, LOSS OF REACTOR OR SECONDARY COOLANT procedure in effect.

11.1 Consult TSC to determine TRANSFER TO SIMULTANEOUS COLD AND HOT LEG RECIRCULATION requirements.

___**12** **Go to procedure and step in effect.**

-END-

START STEP CONTINUOUS ACTION

☐ 1 [CA] Check RWST level - GREATER THAN 4.5 ft.

1[R] IF alignment for recirculation is NOT imminent, THEN stop any pump taking suction from the RWST.

☐ 8 8.1 [CA] Monitor ECCS pump suction conditions - NO INDICATION OF CAVITATION.

☐ 9 [CA] Check containment spray.- IN OPERATION.

☐ 10 [CA] WHEN RWST level less than 4.5 ft, THEN align containment spray for recirculation.

10.5 [CA] WHEN containment spray recirculation flow has been established for at least 8 hours, AND containment pressure is less than 16 psig, THEN stop both CS PUMPs.

Step	Action/Expected Response	Response NOT Obtained

ATTACHMENT 1

___ 1 **Close the following disconnects.**

'B' Train Disconnects				
Disconnect TPNS No.	Description	Position	Key	Location
Q1R18B033-B	Disconnect FV-T2 MOV 8884-B	ON	Z-91	139' hallway across from chemistry sample room
Q1R18B034-B	Disconnect FV-J2 MOV 8132B-B	ON	Z-89	
Q1R18B035-B	Disconnect FV-S2 MOV 8808B-B	ON	Z-86	
Q1R18B036-B	Disconnect FV-B2 MOV 8889-B	ON	Z-88	
Q1R18B041-B	Disc for MOV 8130B-B	ON	Z-408	
Q1R18B042-B	Disc for MOV 8131B-B	ON	Z-412	
Q1R18B043-B	Disc for MOV 8133B-B	ON	Z-416	

Step	Action/Expected Response	Response NOT Obtained

ATTACHMENT 1

___ 2 **Close the following disconnects.**

'A' Train Disconnects				
Disconnect TPNS No.	Description	Position	Key	Location
Q1R18B030-A	Disconnect FU-J2 MOV 8132A-A	ON	Z-203	139' hallway across from MCC 1A
Q1R18B029-A	Disconnect FU-R2 MOV 8886-A	ON	Z-90	
Q1R18B038-A	Disc for MOV 8130A-A	ON	Z-405	
Q1R18B039-A	Disc for MOV 8131A-A	ON	Z-410	
Q1R18B040-A	Disc for MOV 8133A-A	ON	Z-415	
Q1R18B031-A	Disconnect FU-Z3 MOV 8808C-A	ON	Z-85	
Q1R18B032-A	Disconnect FU-Z2 MOV 8808A-A	ON	Z-84	

___ 3 **Verify recirculation valves MCB indication - POWER AVAILABLE.**

CHG PUMP
SUCTION HDR ISO
[] Q1E21MOV8130A
[] Q1E21MOV8130B
[] Q1E21MOV8131A
[] Q1E21MOV8131B

CHG PUMP
DISCH HDR ISO
[] Q1E21MOV8132A
[] Q1E21MOV8132B
[] Q1E21MOV8133A
[] Q1E21MOV8133B

1A(1B,1C) ACCUM
DISCH ISO
[] Q1E21MOV8808A
[] Q1E21MOV8808B
[] Q1E21MOV8808C

Step 3 continued on next page.

Step	Action/Expected Response	Response NOT Obtained

ATTACHMENT 1

CHG PUMP RECIRC
TO RCS HOT LEGS
[] Q1E21MOV8884
[] Q1E21MOV8886

RHR TO RCS
HOT LEGS ISO
[] Q1E11MOV8889

___ 4 **Notify control room of recirculation valve disconnect status.**

-END-

jpm c.

CRO-343G

TITLE: Return Service Water To Normal As Required In Response To A Spurious Safety Injection

PROGRAM APPLICABLE: SOT ___ SOCT ___ OLT _X_ LOCT

ACCEPTABLE EVALUATION METHOD: _X_ PERFORM ___ SIMULATE ___ DISCUSS

EVALUATION LOCATION: _X_ SIMULATOR ___ CONTROL ROOM ___ PLANT

PROJECTED TIME: _10 MIN_ SIMULATOR IC NUMBER: _IC-213 (Base -167)_

ALTERNATE PATH ___ TIME CRITICAL ___ PRA

JPM DIRECTIONS:

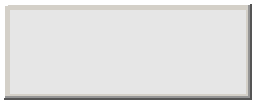
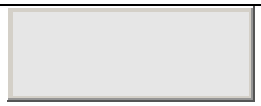
1. Examinee will obtain all references from the simulator.
2. The actions of this task are intended to be performed on an Active Simulator in which the examinee may diagnose the correctness of system response to his/her actions and respond to any abnormal conditions which may arise.
3. Provide student with HANDOUT.
4. Allow student time to review control board.
5. Instructor will be provided to address alarms not related to evaluated task.

TASK STANDARD: Upon successful completion of this JPM, the examinee will:

1. Return Service Water To Normal As Required In Response To A Spurious Safety Injection

Examinee:	
Overall JPM Performance: **Satisfactory** ☐	**Unsatisfactory** ☐
Evaluator Comments **(attach additional sheets if necessary)**	

Developer	S Jackson	Date: 4/7/15
NRC Approval	SEE NUREG 1021 FORM ES-301-3	

EVENT DESCRIPTION	ACTION	DETAILS
Reset into IC-213		
Acknowledge computer alarms		
Run / Freeze Simulator		
Acknowledge Alarms		
Turn Horns ON		
Run / Freeze Simulator		

CONDITIONS

When I tell you to begin, you are to **RETURN SERVICE WATER TO NORMAL AS REQUIRED IN RESPONSE TO A SPURIOUS SAFETY INJECTION**. The conditions under which this task is to be performed are:

a. The Unit has experienced a spurious safety injection.
b. ESP-1.1 is in progress and has been completed through Step 29.6.6.
c. You are directed to perform Step 30 of ESP-1.1.
d. The emergency buses are energized from offsite power.
e. A pre-job brief is not required.

EVALUATION CHECKLIST

	ELEMENTS:	STANDARDS:	RESULTS: (CIRCLE)
	_____ START TIME		
*1.	30.1 Open SW to RCP motor air cooler valve. SW TO RCP MTR AIR CLRS [] Q1P16MOV3135	HS for MOV-3135 taken to open. Observes red light lit, green light out.	S / U
*2.	30.2 Open SW from RCP motor air cooler valves. SW FROM RCP MTR AIR CLRS [] Q1P16MOV3131 [] Q1P16MOV3134	HS for MOV-3131 & 3134 taken to open. Observes red lights lit greens light out.	S / U
*3.	30.3 Restore SW to blowdown and BTRS chillers. SW TO BLDN HX & BTRS CHLRS [] Q1P16MOV3149 SW FROM BLDN HX & BTRS CHLRS [] Q1P16MOV3150	HS for MOV-3149 & 3150 taken to open. Observes red lights lit, greens light out.	S / U

*4.	30.4.1 Open A train isolation valves. SW TO TURB BLDG ISO A TRN [] Q1P16V515 [] Q1P16V516	HS for V515 and V516 taken to open. Observes red lights lit, greens light out	S / U
*5.	30.4.2 Open B train isolation valves. SW TO TURB BLDG ISO B TRN [] Q1P16V514 [] Q1P16V517	HS for V514 and V517 taken to open. Observes red lights lit, greens light out	S / U
6.	30.5 Verify only two SW PUMPs in each train – STARTED. [] A train (1A, 1B, 1C) [] B train (1D, 1E, 1C)	Observes red light lit, green light out for 1A, 1B, 1D, 1E SW pumps. 1C (A train) SW pump will have green light lit, red light out. Pressure indicated on PI-3001A & B, SW TO CCW HX HDR PRESS. 	S / U

_____ STOP TIME

Terminate when service water pumps are aligned as required.

CRITICAL ELEMENTS: Critical Elements are denoted with an asterisk (*) before the element number.

GENERAL REFERENCES:

1. FNP-1-ESP-1.1, Version 25.0
2. K/A: 062AA1.02 - 3.2 / 3.3
   076A4.02 – 2.6 / 2.6

GENERAL TOOLS AND EQUIPMENT:

1. FNP-1-ESP-1.1, Version 25.0

Critical ELEMENT justification:

1 – 5 Critical – Task completion. Required to restore cooling water flow.
6 Not critical. No action required.

COMMENTS:

jpm c

CONDITIONS

When I tell you to begin, you are to **RETURN SERVICE WATER TO NORMAL AS REQUIRED IN RESPONSE TO A SPURIOUS SAFETY INJECTION**. The conditions under which this task is to be performed are:

a. The Unit has experienced a spurious safety injection.
b. ESP-1.1 is in progress and has been completed through Step 29.6.6.
c. You are directed to perform Step 30 of ESP-1.1.
d. The emergency buses are energized from offsite power.
e. A pre-job brief is not required.

Step	Action/Expected Response	Response NOT Obtained

___30 **<u>WHEN</u> emergency 4160 V busses energized from offsite power, <u>THEN</u> restore SW to normal alignment.**

30.1 Open SW to RCP motor air cooler valve.

SW TO RCP
MTR AIR CLRS
[] Q1P16MOV3135

30.2 Open SW from RCP motor air cooler valves.

SW FROM RCP
MTR AIR CLRS
[] Q1P16MOV3131
[] Q1P16MOV3134

30.3 Restore SW to blowdown and BTRS chillers.

SW TO BLDN HX
& BTRS CHLRS
[] Q1P16MOV3149

SW FROM BLDN HX
& BTRS CHLRS
[] Q1P16MOV3150

Step 30 continued on next page.

Step	Action/Expected Response	Response NOT Obtained
	30.4 Restore SW to turbine building.	
	30.4.1 Open A train isolation valves. SW TO TURB BLDG ISO A TRN [] Q1P16V515 [] Q1P16V516	30.4.1 Locally open A train isolation valves. (cover welded) SW TO TURB BLDG ISO A TRN [] Q1P16V515 (valve box 1VB-1A) [] Q1P16V516 (valve box 1VB-1B)
	30.4.2 Open B train isolation valves. SW TO TURB BLDG ISO B TRN [] Q1P16V514 [] Q1P16V517	30.4.2 Locally open B train isolation valves. (cover welded) SW TO TURB BLDG ISO B TRN [] Q1P16V514 (valve box 1VB-1B) [] Q1P16V517 (valve box 1VB-1A)
	30.5 Verify only two SW PUMPs in each train - STARTED. [] A train (1A,1B,1C) [] B train (1D,1E,1C)	
___31	**Restore containment sump pumps to normal operation using FNP-1-SOP-50.2, LIQUID WASTE PROCESSING SYSTEM SUMP PUMP SYSTEM OPERATION.**	

jpm d

CRO-043

TITLE: Start 1A RCP

PROGRAM APPLICABLE: SOT ___ SOCT ___ OLT _X_ LOCT

ACCEPTABLE EVALUATION METHOD: _X_ PERFORM ___ SIMULATE ___ DISCUSS

EVALUATION LOCATION: _X_ SIMULATOR ___ CONTROL ROOM ___ PLANT

PROJECTED TIME: 13 MIN SIMULATOR IC NUMBER: IC-214 (Base – 126)

ALTERNATE PATH _X_ TIME CRITICAL ___ PRA ____

JPM DIRECTIONS:

1. Examinee will obtain all references from the simulator.
2. The actions of this task are intended to be performed on an Active Simulator in which the examinee may diagnose the correctness of system response to his/her actions and respond to any abnormal conditions which may arise.
3. Provide student with HANDOUT.
4. Allow student time to review control board.
5. Instructor will be provided to address alarms not related to evaluated task.

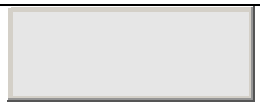
TASK STANDARD: Upon successful completion of this JPM, the examinee will:

1. Start 1A RCP.

Examinee:	
Overall JPM Performance: **Satisfactory** ☐	**Unsatisfactory** ☐
Evaluator Comments **(attach additional sheets if necessary)**	

Developer	S Jackson	Date: 4/7/15
NRC Approval	SEE NUREG 1021 FORM ES-301-3	

EXAMINER: _____

EVENT DESCRIPTION	ACTION	DETAILS
Reset into IC-214		
Acknowledge computer alarms		
Run / Freeze Simulator		
Acknowledge Alarms		
Turn Horns ON		

CONDITIONS

When I tell you to begin, you are to START 1A RCP. The conditions under which this task is to be performed are:

a. The Plant is in Mode 5 with RCS temperature at 183°F.
b. A bubble is established in the Pressurizer.
c. 1B RCP is running.
d. RCS pressure is 345 psig.
e. UOP-1.1, Startup of Unit from Cold Shutdown to Hot Standby, Step 5.14.22 directs 1A RCP startup IAW SOP-1.1, Reactor Coolant System.
f. SOP-1.1 has been completed through step 11 of Section 4.1.
g. You have been directed by the Shift Supervisor to continue the startup of the 1A RCP per SOP-1.1, starting at step 12 of Section 4.1.

EVALUATION CHECKLIST

	ELEMENTS:	STANDARDS:	RESULTS: (CIRCLE)
	_____ START TIME		
	Section 4.1		
*1.	12 **Start** the 1A RCP Oil Lift Pump. Adequate oil pressure is indicated by the white light coming ON.	HS for 1A RCP oil lift pump taken to start. Observes red light lit, green light out. White light comes on a few seconds later.	S / U
2.	13 **Verify** that the 1A RCP SEAL LEAKOFF valve Q1E21HV8141A is OPEN.	Observes red light lit, green light out.	S / U
3.	14 **Verify** that 1A RCP No. 1 Seal Leakoff Flow rate is within the limits of Figure 1.	Determines Seal leakoff flow rate within limits of Figure 1.	S / U
4.	15. **Verify** that the SEAL WTR INJ FLTR HI ΔP annunciator DC4 is clear.	Observes DC4 is NOT lit.	S / U
	Note: Applicant may go to DD1 which directs raising seal injection flow using HIK-186.		
*5.	16 **Verify** that the RCP SEAL INJ FLOW LO annunciator DD1 is clear. .	Adjusts HIK-186, SEAL WTR INJECTION potentiometer clockwise to raise flow > alarm setpoint & observes DD1 is clear.	S / U

EVALUATION CHECKLIST

	ELEMENTS:	STANDARDS:	RESULTS: (CIRCLE)
6.	17 **Verify** that all RCP No. 1 Seal ΔP's are greater than 210 psid.	Observes PI-156A, 155A, 154A – 1A, 1B, 1C RCP #1 SEAL PRESS are all > 210 psid.	S / U
7.	18 **Verify** that the RCP #1 SEAL LO ΔP annunciator DC3 is clear.	Observes DC3 is clear.	S / U
8.	19 **Verify** that the Oil Lift Pump for RCP 1A has run for at least 2 minutes, and is producing adequate pressure (white light ON).	Observes white light is lit and 2 minutes have elapsed.	S / U
*9.	20. **Start** 1A RCP. Verify that all loop 1A flow instruments show an increasing flow rate.	Places 1A RCP Pump hand switch to start & observes pump breaker indicator red light lit, FI-414, 415, and 416 show increasing flow rate.	S / U
10.	21 **Verify** that RCP 1A amperage decreases to a normal operating range of 900 amps cold and 700 amps hot.	1A RCP AMPMETER checked & observes Amp meter indicates ~850 amps.	S / U
11.	22 **Verify** that the 1A RCS LOOP FLOW LO annunciator EF1 is clear. .	Observes EF1 is clear.	S / U
12.	23 After at least 1 minute of 1A RCP operation, **stop** the Oil Lift Pump.	After at least 1 minute of RCP operation then the 1A RCP Oil Lift Pump hand switch taken to stop and observes pump breaker indicator green light lit, red light out.	S / U
13.	24 Observe RCP operating parameters very closely during the initial several minutes after starting. Special attention should be given to indications relating to seal performance.	RCS flow, amps, seal injection flow and bearing temperatures checked & observes all parameter normal except RCP bearing temperatures.	S / U

Note: HG1 will alarm and applicant refers to the ARP. This begins the ALTERNATE PATH.

EVALUATION CHECKLIST

ELEMENTS:	STANDARDS:	RESULTS: (CIRCLE)
14. HG1 - 1 Continuously monitor 1A RCP bearing temperatures.	Observes IPC to monitor RCP bearing temperatures.	S / U

Note: Element 15 b) is critical. Applicant may stop 1A RCP before 195°F based on temperature rising.

* 15. HG1-2 IF any 1A RCP motor bearing temperature exceeds 195°F, THEN perform the following actions:		
a) Trip the reactor, AND go to FNP-1-EEP-0.0, REACTOR TRIP OR SAFETY INJECTION.	**This step is N/A**	S / U
b) Stop 1A RCP.	HS for 1A RCP taken to stop. Observes green light lit and red light out.	S / U
c) Perform the actions required by FNP-1-AOP-4.0, LOSS OF REACTOR COOLANT FLOW.	**CUE: Another operator will continue with the procedure. The JPM is complete.**	

.

_____ STOP TIME

Terminate when 1A RCP is secured.

CRITICAL ELEMENTS: Critical Elements are denoted with an Asterisk (*) before the element number.

GENERAL REFERENCES

1. FNP-1-SOP-1.1, ver 49.1
2. FNP-1-UOP-1.1, ver 103
3. FNP-1-ARP-1.4, ver 55.0
4. FNP-1-ARP-1.8, ver 36.0
5. K/As: 003A1.02 – 2.9 / 2.9
   003A2.03 – 2.7 / 3.1

GENERAL TOOLS AND EQUIPMENT

1. Provide: Marked up SOP-1.1

Critical ELEMENT justification:

1	Critical – Required to prevent RCP damage.
2-4	Not critical – No actions required.
5	Critical – Required for proper seal cooling
6-8	Not critical – No actions required.
9	Critical – Task completion
10-11	Not critical – No actions required.
12	Not critical – Will not prevent RCP from running
13, 14	Not critical – No actions required.
15	Critical - Required to prevent RCP damage

COMMENTS

CONDITIONS

When I tell you to begin, you are to START 1A RCP. The conditions under which this task is to be performed are:

a. The Plant is in Mode 5 with RCS temperature at 183°F.
b. A bubble is established in the Pressurizer.
c. 1B RCP is running.
d. RCS pressure is 345 psig.
e. UOP-1.1, Startup of Unit from Cold Shutdown to Hot Standby, Step 5.14.22 directs 1A RCP startup IAW SOP-1.1, Reactor Coolant System.
f. SOP-1.1 has been completed through step 11 of Section 4.1.
g. You have been directed by the Shift Supervisor to continue the startup of the 1A RCP per SOP-1.1, starting at step 12 of Section 4.1.

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SAFETY RELATED

STARTUP OF UNIT FROM COLD SHUTDOWN TO HOT STANDBY

PROCEDURE LEVEL OF USE CLASSIFICATION PER NMP-AP-003	
CATEGORY	**SECTIONS**
Continuous:	**ALL**
Reference:	**NONE**
Information:	**NONE**

Approved: David L. Reed
Operations

Effective Date: February 20, 2015

Procedure Version Description

Version Number	Version Description
97.0	• CR 511531 - Added IC 2.12, modified 2.11 to check both MCCs aligned to normal source per SOP-36.3, pg15 • CR 656952 - Deleted requested steps, modified 5.3.3.1, 2 (now 5.3.2.1, 2) to designate CHM sampling procedure which contains the analysis requirements • Converted step 5.2.20 to a caution (5.2.16.3), deleted duplicate step 5.3.1 • Added records section
97.1	Reinstated broken Cross Reference in Appendix 5, step 3.2. CR 715274
98.0	**CR# 721257** • pg 41 added NOTE prior to 5.14, added substep 5.14.24 • pg 42 added NOTE prior to 5.17, added substep 5.17.11 • pg 43 added step 5.17.1.2 and substeps
99.0	Added step 5.4.2, found in Unit 2 procedure, applicable here also.
100.0	Deleted # from steps 2.4.9, 2.4.17, 2.4.18 & 2.8 as NOT Applicable. Added reference to UOP-2.4 in step 5.4.3.
101.0	Implemented changes per CR 723006. Implemented changes per LDCR 2012011.
101.1	Implemented changes per CR 739472.
102.0	Implemented changes per CR 482410 and CR 698730 Replaced reference to EMP-1906.01 with NMP-MA-018.
103.0	CR 826059 - Modified the following steps: • pg 16 - P&L 3.1 - changed 225 deg to 212 deg • pg 24 - TS ref 4.8 - changed 225 deg to 212 deg • pg 41 - Caution 5.14.23 - changed 225 deg to 212 deg • pg 42 - Note 5.14.24, 5.14.25 - changed 225 deg to 212 deg • pg 42 - Step 5.14.24 - Changed from conditional to STOP, added prior to 210 deg • pg 43 - Note 5.17 - changed 225 deg to 212 deg • pg 43 - Step 5.17 - changed 220 deg to 210 deg • pg 44 - Step 5.17.2 - changed 225 deg to 212 deg CR 845049 - Ver 103.0 Del Step 5.20 per CR

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1.0 Purpose

This procedure provides the Initial Conditions, Precautions, Technical Specification Requirements and Instructions for the startup of unit from a Cold Shutdown condition to a Hot Standby condition.

1.1 Each Step should be initialed as it is performed, and the date and time recorded where space is provided. The step may be initialed by the individual performing the step or by an individual who knows the specified step is in fact complete. For example: If individual based on knowledge and review is aware the condensate and feedwater system has been placed in operation as required by a procedural step, then the individual may initial for performance of this action even though he/she did not physically place the system in operation.

_____ (Initials
_____ / _____ (Date/Time)

1.2 If this procedure is required to be used beginning at plant conditions other than Cold Shutdown, then the Shift Supervisor will review all Initial Conditions and all Instructions up to the existing plant conditions. Initial conditions and Instructions that are not applicable due to plant conditions will be marked N/A and initialed by the Shift Supervisor; all other items will require normal sign-off required by step 1.1.

1.3 The Initial Conditions that are denoted with an asterisk (*) should be completed prior to commencing RCS heatup to facilitate reactor startup to minimum load; however these items, if required, may be completed during RCS heatup or at the hot standby condition.

1.4 Per NMP-OS-007-001, CONDUCT OF OPERATIONS STANDARDS AND EXPECTATIONS, Unit Operating Procedures have many tasks which may be performed concurrently. The Shift Supervisor may allow procedural steps to be performed out of sequence if it does not result in omission of required work, violate the intent of the procedure, or create an unsafe plant condition.

1.5 If a steam space has not been formed in the pressurizer, then the Initial Conditions denoted with a pound symbol (#) must be completed prior to drawing a steam space in the pressurizer, other Initial Conditions must be completed prior to entry to Mode 4 unless otherwise noted.

2.0 Initial Conditions

2.1 The version of this procedure has been verified to be the current version. (OR 1-98-498) _____

2.2 The version of this procedure has been verified to be the correct unit for the task. (OR 1-98-498) _____

2.3 Unless otherwise specified, plant systems are aligned for automatic control. _____

2.3.1 If required by plant conditions, then a system may be placed in manual control.

2.4 The RCS and associated systems are in the following condition:

2.4.1 #The RCS has been filled and vented per one of the following procedures:

- FNP-1-SOP-1.3, Reactor Coolant System Filling and Venting-Vacuum Method _____

  _____ / _____

- FNP-1-SOP-1.10, Reactor Coolant System Fill and Vent Following Partial Drain _____

  _____ / _____

- FNP-1-SOP-1.11, Reactor Coolant System Filling and Venting-Dynamic Method, _____

  _____ / _____

2.4.2 The RCS water chemistry is within the limits specified in FNP-0-CCP-202, Water Chemistry Specifications. _____

_____ / _____
CHEM

2.4.3 *The steam generators levels are being maintained in the wide range or in wet lay-up. _____

2.4.4 Steam generator water chemistry is within the limits specified in FNP-0-CCP-202, Water Chemistry Specifications, for RCS temperature greater than 200°F. _____

_____ / _____
CHEM

2.4.5 The RHR system is aligned for operation per FNP-1-SOP-7.0, Residual Heat Removal System, with the RHR pumps running as required to maintain RCS temperature 100-180°F. ☐

2.4.6 #The CVCS valves are aligned for normal operation per checklist FNP-1-SOP-2.1A, Chemical and Volume Control System Plant Startup and Operation, with exceptions noted. ☐

2.4.7 The RCS is being maintained between 50-375 psig as follows:

- LP LTDN PRESS PK 145 controlling pressure _____
- One charging pump in service _____
- Two charging pump breakers are racked out and tagged _____
- Low pressure letdown in service _____
- All three (3) letdown orifice isolation valves open _____

2.4.8 #VCT pressure is being maintained at a minimum of 18 psig as follows:

2.4.8.1 VCT has a nitrogen or hydrogen atmosphere established. ☐

2.4.8.2 If a nitrogen atmosphere exists in the VCT, then the nitrogen regulator to the VCT N1E21V322 (1-CVC-PCV-8155) is adjusted to greater than or equal to 18 psig. ☐

2.4.8.3 If a hydrogen atmosphere exists in the VCT, then the hydrogen regulator to the VCT N1E21V323 (1-CVC-PCV-8156) is adjusted to greater than or equal to 18 psig. ☐

2.4.9 FNP -1-STP-35.1C, ENABLING ROD CONTROL SYSTEM SURVEILLANCE CHECKLIST, has been completed prior to enabling rod control. (Keff must be less than 0.99) _____

_____ / _____

2.4.10 #Control rod positions are maintained within the following guidance: _____

_____ / _____

- All Control bank rods are fully inserted.
- The shutdown bank can be fully withdrawn or inserted when the RCS is borated to the cold shutdown condition.
- The shutdown banks must be at the fully withdrawn position whenever reactivity is being changed by boron dilution, xenon concentration changes, RCS temperature changes or control bank rod movement, Except
  - The RCS has been borated to the cold shutdown concentration

  OR
  - The RCS has been borated to the hot, xenon-free concentration and is being maintained at no-load TAVG.

2.4.11 #IF a pressurizer steam space has NOT been established in accordance with an appropriate procedure, THEN following equipment conditions exist.

PRESSURIZER HEATERS DE-ENERGIZED:

1A PRZR HTR GROUP BACKUP OFF	☐
1B PRZR HTR GROUP BACKUP OFF	☐
1C PRZR HTR GROUP VARIABLE OFF	☐
1D PRZR HTR GROUP BACKUP OFF	☐
1E PRZR HTR GROUP BACKUP OFF	☐

PRESSURIZER SPRAY VALVES IN MANUAL:

1A LOOP SPR VLV PK 444C CLOSED.	☐
1B LOOP SPR VLV PK 444D CLOSED	☐

2.4.12 #The reactor makeup control is in automatic and set for blended flow equal to RCS boron concentration per FNP-1-SOP-2.3, Chemical And Volume Control System Reactor Makeup Control System. _____

2.4.13 #The pressurizer power operated relief valves are aligned as follows:

- PRZR PORV Q1B31PCV444B in AUTO indicates CLOSED. _____
- PRZR PORV Q1B31PCV445A in AUTO indicates CLOSED. _____

2.4.14 #The following conditions exist for the pressurizer relief tank.

2.4.14.1 Pressurizer relief tank is filled to the operating level. _____

2.4.14.2 Pressurizer relief tank aligned for normal operation per one of the following:

- FNP-1-SOP-1.2, Reactor Coolant Pressure Relief System _____

OR

- FNP-1-SOP-1.3, Reactor Coolant System Filling And Venting _____

OR

- FNP-1-SOP-1.11, Reactor Coolant System Filling And Venting – Dynamic Method _____

2.4.14.3 Verify closed the PRT manual vent N1B13V004 (1-RC-V-8048). _____

2.4.14.4 Verify the blind flange is installed on PRT manual vent N1B13V004 (1-RC-V-8048). _____

2.4.15 An RHT is in service per FNP-1-SOP-2.4, Chemical and Volume Control System Boron Recycle System, with the specified volume available for each listed evolution.

2.4.15.1 #An RHT has a capacity of at least 10,000 gallons to receive discharge from the RCS during formation of a pressurizer steam space. _____

_____ / _____

2.4.15.2 An RHT has a capacity of at least 50,000 gallons to receive discharge from the RCS during heat up. _____

_____ / _____

2.4.16 #Manway covers are installed on all RHTs to be used during plant startup. _____

2.4.17 Main Steam Isolation Valves and the bypass valves CLOSED status lights are illuminated: _____

_____ / _____

	N1H11ZI2111E		
	1A	**1B**	**1C**
MS ISO	3369A CLOSED	3369B CLOSED	3369C CLOSED
MS ISO BYP	3368A CLOSED	3368B CLOSED	3368C CLOSED
MS ISO BYP	3976A CLOSED	3976B CLOSED	3976C CLOSED
MS ISO	3970A CLOSED	3970B CLOSED	3970C CLOSED

2.4.18 The main steam isolation bypass warm-up valves are closed: _____

_____ / _____

- 1A MS BYP WARMUP VLV, N1N11V019A
- 1B MS BYP WARMUP VLV, N1N11V019B
- 1C MS BYP WARMUP VLV, N1N11V019C

2.4.19 #RX VESSEL LKOF ISO Q1B13HV8032 is open. _____

NOTES

- The following step may be performed any time prior to starting the first RCP. ☐
- The intent of sampling in the following Step is to ensure the boron concentration is sufficient to prevent a dilution accident when starting the first RCP. Instrument lines should be adequately flushed prior to obtaining sample. (SOER 94-2) ☐

2.4.20 IF no RCPs are in operation, THEN Chemistry in coordination with I&C has performed the following:

2.4.20.1 Obtained an RCS sample from one flow transmitter per loop. _____

2.4.20.2 Analyzed samples from each RCS loop. ☐

2.4.20.3 Record each intermediate leg boron concentration.(SOER 94-2) _____

_____ / _____

"A" Loop boron:_____ppm

"B" Loop boron:_____ppm

"C" Loop boron:_____ppm

2.4.20.4 Verify each intermediate leg boron concentration is greater than or equal to the required cold shutdown boron concentration. _____

2.4.21 IF any RCS loop boron concentration is less than cold shutdown boron concentration, THEN drain the intermediate leg of that loop per FNP-1-SOP-1.5, Draining the Reactor Coolant System Via the RCDT, Appendix 3. _____

_____ / _____

2.4.22 IF the Reactor Trip Breakers are closed AND the rod control system is capable of rod withdrawal, THEN verify the current RCS boron concentration is greater than the ARO critical boron concentration (Curve 1A) [NEL-01-0093] [AIT # 2001201049] _____

_____ / _____

2.5 The following systems are in operation and aligned per the respective system operating procedure and system checklist:

2.5.1 #The electrical distribution system is energized and aligned for normal operation per FNP-1-SOP-36.0, Plant Electrical Distribution Line-up, with exceptions noted. ☐

2.5.2 *The river water building HVAC system is in operation per FNP-0-SOP-52.0, River Water Building Heating and Ventilation, with exceptions noted. ☐

2.5.3 The river water system is in operation and aligned per FNP-0-SOP-25.0, River Water System, with exceptions noted. ☐

2.5.4 The river water system auxiliaries are aligned and in operation per FNP-0-SOP-25.2, River Water Auxiliary Systems, with exceptions noted. ☐

2.5.5 The service water building HVAC system is in operation per FNP-0-SOP-53.0, Service Water Building Heating and Ventilation, with exceptions noted. ☐

2.5.6 #The service water system is in operation and aligned per FNP-1-SOP-24.0, Service Water System, with exceptions noted. ☐

2.5.7 #The service water system auxiliaries are aligned and in operation per FNP0-SOP-24.2, Service Water Auxiliary Systems, with exceptions noted. ☐

2.5.8 #The compressed air system is in service and aligned for normal operation per the following checklists with exceptions noted.

- FNP-1-SOP-31.0A, Turbine Building Compressed Air System ☐
- FNP-1-SOP-31.0B, Auxiliary Building Instrument Air System ☐

2.5.9 The auxiliary building HVAC system is in operation and aligned per FNP-1-SOP-58.0, Auxiliary Building HVAC System, with exceptions noted. ☐

2.5.10 The control room HVAC system is in operation and aligned per FNP-0-SOP-56.0, Control Room HVAC System, with exceptions noted. ☐

2.5.11 *The turbine building HVAC system is in operation and aligned per FNP-1-SOP-57.0, Turbine Building HVAC System, with exceptions noted. ☐

2.5.12 #The reactor makeup water system is in service and aligned for normal operation per FNP-1-SOP-4.0, Reactor Makeup Water System, with exceptions noted. ☐

2.5.13 *The demineralized water system is in service per FNP-1-SOP-5.0, Demineralized Makeup Water System, with exceptions noted. ☐

2.5.14 *Prior to reaching mode 3 with RCS pressure greater than 1000 psig and the accumulator discharge valves closed, the accumulators are filled and pressurized per FNP-1-SOP-8.0, Safety Injection System – Accumulators. ☐

2.5.15 The high head injection system is aligned for normal operation per FNP-1-SOP-8.1A, High Head Safety Injection System, with exceptions noted. ☐

2.5.16 #The component cooling system is in service and aligned for operation per FNP-1-SOP-23.0, Component Cooling Water System, with exceptions noted. ☐

2.5.17 *The hydrogen seal oil system is in service per FNP-1-SOP-28.3, Hydrogen Seal Oil System, with exceptions noted. ☐

2.5.18 *The generator hydrogen system is in service and aligned for normal operation per FNP-1-SOP-27.0, Generator Gas and Monitoring System, with exceptions noted. ☐

2.5.19 The diesel generator fuel oil system is aligned for normal operation per FNP-0-SOP-42.0, Diesel Generator Fuel Oil Storage and Transfer System, with exceptions noted. ☐

2.5.20 The diesel generator building HVAC is in service per FNP-0-SOP-43.0, Diesel Generator Building HVAC, with exceptions noted. ☐

2.5.21 The diesel generators are aligned for automatic start operation per FNP-0-SOP-38.0, Diesel Generators, with exceptions noted. ☐

2.5.22 #The nuclear instrumentation system is aligned for operation per FNP-1-SOP-39.0, Nuclear Instrumentation System, with exceptions noted. ☐

2.5.23 The reactor control and protection system is aligned for operation per FNP-1-SOP-40.0, Reactor Control and Protection System, prior to exceeding 200°F. ☐

2.5.24 *The control rod position indication system is aligned for normal operation per FNP-1-SOP-41.0, Control Rod Drive and Position Indication System, with exceptions noted. ☐

2.5.25 The radiation monitoring system is aligned for normal operation per FNP-1-SOP-45.0, Radiation Monitoring System, with exceptions noted. ☐

2.5.26 #The liquid waste processing system is aligned for operation per FNP-1-SOP-50.0, Liquid Waste Processing System, with exceptions noted. ☐

2.5.27 #The LWP sump pumps are aligned for operation per FNP-1-SOP-50.2, Liquid Waste Processing System Containment and Auxiliary Building Sump Operation, with exceptions noted. ☐

2.5.28 The penetration room filtration system is aligned for normal operation per FNP-1-SOP-60.0, Penetration Room Filtration System, with exceptions noted. ☐

2.5.29 The fire protection system is aligned for normal operation per the following procedures with exceptions noted.

- FNP-1-SOP-61.1, Fire Protection Water Systems ☐
- FNP-0-SOP-61.1A, Fire Protection Wayer - Service Water AND Diesel Building ☐
- FNP-0-SOP-61.2, High Pressure CO_2 System ☐
- FNP-0-SOP-61.3, Fire Protection - Low Pressure CO_2 Systems ☐
- FNP-1-SOP-61.4, Fire Protection - Halon System ☐

2.5.30 *The control rod drive system is aligned for normal operation per FNP-1-SOP-41.0, Control Rod Drive and Position Indication System, with exceptions noted. ☐

2.5.31 *The Circulating Water canal make-Up is being controlled as follows:

2.5.31.1 Control Valve, Q1P16V560, is in the OPEN position. ☐

2.5.31.2 Canal level is being maintained by use of manual N1P16V748, CW CANAL SW SUPP MANUAL ISO. ☐

2.6 The following systems are aligned for operation per their respective system checklists:

2.6.1 Prior to Mode 3 entry the Auxiliary feedwater system is aligned per the checklist FNP-1-SOP-22.0A, Auxiliary Feedwater System, with exceptions noted.

_____

_____ / _____

2.6.2 Containment spray system per checklist FNP-1-SOP-9.0A, Containment Spray System, with exceptions noted.

_____

_____ / _____

2.6.3 Post LOCA CTMT pressurization and vent system per checklist FNP-1-SOP-10.0A, Post LOCA Containment Pressurization and Vent Ssystem, with exceptions noted.

_____

_____ / _____

2.6.4 Containment purge, and pre-access filtration system per checklist FNP-1-SOP-12.2A, Containment Purge and Pre-Access Filtration System, with exceptions noted.

_____

_____ / _____

2.6.5 Steam generator blowdown system per the following checklists with exceptions noted.

- FNP-1-SOP-16.1A, Steam Generator Blowdown Processing System

_____

_____ / _____

- FNP-1-SOP-16.2A, Steam Generator Blowdown System Demineralizers

_____

_____ / _____

2.6.6 *Main and Reheat steam system per checklist FNP-1-SOP-17.0A, Main and Reheat System. ☐

2.6.7 *Feedwater heaters extraction, vents and drains per checklist FNP-1-SOP-20.0A, Feedwater Heaters Extraction Vents & Drains, with exceptions noted. ☐

2.6.8 *Condensate and feedwater per checklist FNP-1-SOP-21.0A, Condensate and Feedwater System, with exceptions noted. ☐

2.6.9 Boron thermal regeneration system per checklist FNP-1-SOP-3.0A, Boron Thermal Regeneration System, with exceptions noted. ☐

2.6.10 *Circulating water system per checklist FNP-1-SOP-26.0A, Circulating Water System, with exceptions noted. ☐

2.6.11 *The main turbine per checklist FNP-1-SOP-28.1A, Turbine Generator Operation, with exceptions noted. ☐

2.6.12 *Lube oil transfer, purification and storage per checklist FNP-1-SOP-28.2A, Main Lube Oil Transfer, Purification and Storage System, with exceptions noted. ☐

2.6.13 *Gland sealing steam system per checklist FNP-1-SOP-28.4A, Gland Sealing Steam System, with exceptions noted. ☐

2.6.14 *Condenser air removal system per checklist FNP-1-SOP-28.5A, Condenser Air Removal System, with exceptions noted. ☐

2.6.15 Nitrogen system per checklist FNP-0-SOP-33.0A, Bulk Nitrogen Storage System, with exceptions noted. ☐

2.6.16 Hydrogen-Oxygen systems per checklist with exceptions noted.

- FNP-0-SOP-34.0A,Hydrogen Storage Area - Shared ☐
- FNP-0-SOP-34.0B, Hydrogen Distribution System Unit 1 ☐
- FNP-0-SOP-34.0D, Oxygen Distribution System Shared. ☐

2.6.17 #Waste gas system per checklist FNP-1-SOP-51.0A, Waste Gas System, with exceptions noted. ☐

2.6.18 Liquid waste system is aligned per the following checklists with exceptions noted:

- FNP-1-SOP-50.0A, Reactor Coolant Drain Collection and Discharge System _____
- FNP-1-SOP-50.0C, Floor Drain Tank and Waste Monitor Tank Demineralizer _____
- FNP-1-SOP-50.0D, Chemical Drain Tank _____
- FNP-1-SOP-50.0E, Laundry and Hot Shower Tank _____

NOTE

Annunciators EF4, RCP UV SINGLE INPUT ALERT and EF5, RCP BUS UF SINGLE INPUT ALERT would be in alarm if an applicable knife switch was open. ☐

The access cover can not be installed with an open knife switch. ☐

2.7 The cover for accessing the knife switches for 4160V buses 1A, 1B, 1C undervoltage/underfrequency testing are verified in place AND sealed.

_____

_____ / _____

2.8 Verify all main steam pipe hanger spring cans are unblocked.

_____

_____ / _____
MM

2.9 Verify all outstanding FNP-0-ETP-4179s are complete.
FNP-0-ETP-4179, Main Steam Pipe Hanger Blocking

_____

_____ / _____
ES

2.10 The N-16 Primary to Secondary Leak Detection System has been placed in service per FNP-1-SOP-69.0, N-16 Primary to Secondary Leak Detection System.

_____

_____ / _____

2.11 1F 600V MCC is aligned to the normal source per FNP-1-SOP-36.3, 600, 480, AND 208/120 Volt AC Electrical Distribution System.

_____

_____ / _____

2.12 1G 600V MCC is aligned to the normal source per FNP-1-SOP-36.3, 600, 480, AND 208/120 Volt AC Electrical Distribution System.

_____

_____ / _____

3.0 Precautions and Limitations

3.1 RHR pumps shall NOT be operated in cooldown operation at RCS temperatures greater than 212°F. If any RHR pump is operated in cooldown operation with RCS temperature greater than 212°F, then declare the associated train of ECCS inoperable and do not enter Mode 3 until all portions of RHR piping is less than 212°F. One train of ECCS must be operable in Mode 4.
(TS 3.5.3) (CR 2010106118)

3.2 Prior to starting any RCP, consideration should be given to raising applicable bus voltage to the upper limit of its acceptable band (3900 – 4200 volts). This consideration is due in part to a known issue with the RCP motor protective relaying causing inappropriate trips during motor starting. This issue is exaggerated when bus voltage is low and/or other large loads are already in service on the applicable bus and/or transformer, i.e. Circ Water Motors. (AI 2010200391)

3.3 Temperatures and Pressures:

3.3.1 The RHR system must be isolated from the RCS before the following:

- RCS temperature reaches 350°F, Or
- RCS pressure reaches 427 psig, Or
- The pressurizer temperature reaches 475°F.

3.3.2 Do not isolate RHR from the RCS until all RCS cold legs are > 275°F.

3.3.3 Power must be removed from B Train RCS loop isolation valves when RCS temperature greater than 350°F due to the potential for a fire induced cable failure opening both valves.(CR 2005103659)

3.3.4 Do not operate the RCPs when the number 1 seal differential pressure is less than 210 psid or VCT pressure is less than 18 psig.

3.3.5 Do not exceed RCP seal injection temperature of 130°F.

3.3.6 Maintain RCS heatup rates within limits of the Pressure Temperature Limits Report, Figure 2-1.

3.3.7 The maximum allowable heatup rate for the pressurizer is 100°F/hr.

3.3.8 Whenever the pressurizer is being cooled or filled, the temperature differential between the pressurizer and the RCS must not exceed 320°F. Monitor the pressurizer liquid, surge line and loop B hot leg temperatures to ensure that a pressurizer outsurge is taking place. This will prevent thermal stratification from taking place.

3.3.9 During periods when the RCS temperature is low with a bubble in the pressurizer, increases to the pressurizer level should be done in a gradual manner. Consideration should be made to performing small batch makeups (less than 150 gallons) along with energization of additional heaters prior to increasing the pressurizer level (CR 442638)

3.3.10 Prior to starting or stopping a RHR pump with the RCS under solid plant pressure control and the RHR system aligned for letdown, place LP LTDN PRESS PK 145 in MANUAL to prevent RCS pressure fluctuations.

3.3.11 At least one CRDM cooling fan must be in service when the RCS temperature is greater than 350°F.

3.3.12 During approach to normal operating temperature and pressure for Hot Standby conditions, plant equipment controlling RCS temperature and pressure should be monitored diligently for proper and expected responses.

3.3.13 The following precautions apply to the operation of the RCPs:

3.3.13.1 With a steam space in the pressurizer 1B RCP is the preferred pump to run for optimum pressurizer spray flow and pressure control.

3.3.13.2 FNP-1-UOP-1.1, Appendix 5, is required to be performed prior to starting any RCP when all RCPs have been idle for more than 5 minutes with seal water flow established during solid plant operations.

3.3.13.3 At least one RCP should be running when the RCS temperature is greater than 160°F.

3.3.13.4 The number of operating RCPs is limited to one at RCS temperatures less than 110°F. A second pump may be started for the purpose of maintaining continuous flow while taking the operating pump out of service.

3.3.13.5 A RCP shall not be started with one or more of the RCS cold leg temperatures less than or equal to 275°F unless one of the following conditions exists:

The pressurizer water volume is less than 24% wide range cold pressurizer level indication. (LI 462),

OR

The secondary water temperature of each steam generator is less than 50°F above each of the RCS cold leg temperatures.

3.3.14 RCS pressure must be maintained within limits of Figure 1 while running RCPs to assure RCP NPSH requirements.

3.3.15 During steam plant warm-up, draw steam slowly and regulate feedwater additions carefully to avoid rapid cooling of the RCS.

3.3.16 Any seal injection throttle valve adjustments should be verified acceptable per SR 3.5.5.1 with the “strongest” and “weakest” charging pump supplying flow within 4 hours. Engineering Support can supply information as to the strongest and weakest pumps

3.3.16.1 If it is not feasible to run FNP-1-STP-8.0, RCP Seal Controlled Leakage Test, using either the strongest or weakest pump (i.e. pump not capable of running or breaker racked out), then the surveillance should be run with the two available charging pumps

3.3.16.2 Generate an administrative LCO for the inoperable pump to ensure FNP-1-STP-8.0, RCP Seal Controlled Leakage Test, is run when the pump is returned to service.

3.3.17 After any significant change in charging flow, the reactor coolant pump seal flow should be checked and adjusted if necessary.

3.3.18 Adjusting individual RCP seal flows at RCS pressures between 2215 and 2255 psig will requiring perform FNP-1-STP-8.0, RCP Seal Controlled Leakage Test, for both the strongest and weakest charging pumps within 4 hours. This will ensure that total flow is within the limits of Technical Specification 3.5.5.

3.3.19 Do not exceed primary to steam generator differential pressure of 1600 psid.

3.3.20 RCP SEAL WTR BYP Q1E21HV8142 must be operated as follows:

3.3.20.1 During RCS pressurization or during cooldown and depressurization, the number 1 seal bypass valve should be left closed. The number 1 seal leakoff bypass valve should only be opened under the following conditions:

a. The RCP bearing temperature (seal inlet temperature) or number 1 seal leakoff temperature approaches it's alarm setpoint

AND

b. The RCS is greater than 100 psig, but less than 1000 psig,

AND

c. The number 1 seal leakoff valve is open

AND

d. The number 1 seal leakoff flow rate is less than 1 gpm,

AND

e. Seal injection water flow rate to each pump is greater than 6 gpm.

3.3.20.2 During RCS pressurization, the number 1 seal water bypass valve and the number 1 seal leak-off valve should remain closed until the RCS pressure is 100 psig (minimum), at which time the bypass valve may be opened (if necessary) only after the number one seal leak-off valves have been opened.

3.3.20.3 During normal operation, the bypass valve should remain closed.

3.3.20.4 The seal bypass valve should never be opened during a loss of injection water.

3.3.21 In Mode 3 with less than two RCPs operating, the rod control system must be disabled for rod withdrawal.

3.3.22 The RCPs are not designed for “start-stop” operations. Too frequent starting may damage the motor windings. To prevent such damage the following maximum starting duty should be observed:

3.3.22.1 Only one RCP is to be started at any one time.

3.3.22.2 After any running period allow a minimum a 30 minute idle period before attempting a restart.

3.3.22.3 After any attempted start failure, allow a minimum 30 minute idle period before attempting a restart

3.3.22.4 After three starts or attempted starts have been made within a two hour period, allow a 60 minute idle period before attempting an additional start.

3.3.23 Prior to exceeding 200°F in the RCS, ensure the MSIVs are Tagged Closed, if conditions on the secondary side require a main steam clearance.

3.3.24 If a known primary to secondary leak exists, contact the Shift Radiochemist to implement FNP-0-CCP-645, Main Steam Abnormal Environmental Release prior to running the TDAFW pump or operating the SG atmospheric relief valves during heat up.

3.3.25 The RCS loops are considered to be “not filled” per Technical Specification 3.4.8 if RCS pressure has NOT been maintained greater than 100 psig since the most recent RCS filling and venting.

3.3.26 Prior to raising pressure following Mode 3 entry, review the FNP-1-SOP-1.1, Reactor Coolant System precautions concerning RCP seals.

3.3.27 Prior to entry into Mode 4, ensure Maintenance has the RTD Cross-Calibration data acquisition test equipment functionally tested, hooked up and ready to proceed with data-taking before the plant enters Mode 4 so that no RCS heat up delays will be encountered at the 250°F temperature plateau point.
TE 513300

3.4 Chemistry:

3.4.1 Before the RCS or pressurizer exceeds 180°F the chemistry requirements as specified in FNP-0-CCP-202, Water Chemistry Specifications, must be met.

3.4.2 The mixed bed demineralizer should be removed from operation when hydrazine is added to the RCS and should not be returned to operation until the hydrazine and resulting ammonia have been reduced to less than 1 ppm total (hydrazine plus ammonia).

3.4.3 The boron concentration in the pressurizer should not be less than the RCS loops by more than 50 ppm. Following a change of boron concentration in the RCS, the pressurizer spray must be operated to equalize the concentration throughout the system. Automatic operation of the spray should be initiated by manual operation of the pressurizer heaters when there is a steam space in the pressurizer.

3.4.4 The flow rate through the RCS shall be determined to be greater than 3000 gpm prior to the start of and at least once per hour during a reduction in the RCS boron concentration. This data should be recorded in the miscellaneous section of FNP-1-STP-1.0, Operations Daily and Shift Surveillance Requirements.

3.4.5 At least once RCP must be in operation prior to performing any RCS dilution or boration. (SOER 94-2)

3.4.6 Large volume RCS dilutions or RCS feed and bleed operations that are performed after the RCS exceeds 180°F, but prior to establishing a hydrogen atmosphere in the VCT, should be coordinated with Chemistry personnel. Such additions of water to the RCS from the RMWST could cause the RCS to exceed the dissolved oxygen limits of Technical Requirement 13.4.1.

3.5 Reactivity Control:

3.5.1 The shutdown banks must be at the fully withdrawn position whenever reactivity is being changed by:

- Boron dilution
- Xenon concentration changes
- RCS temperature changes
- Control bank rod movement.

3.5.1.1 This precaution is not applicable for the following conditions:

The RCS has been borated to the cold shutdown concentration

OR

The RCS boron concentration is greater than the ARO critical boron concentration (Curve 1A) [NEL-01-0093] [AIT#2001201049]

3.5.2 In the source range reactivity must not be changed by more than one controlled method at a time. An exception to this is control rod operability testing.

3.5.3 The reactor shutdown margin must be maintained as required by Technical Specifications 3.1.1.

3.5.4 A minimum of one source range channel shall be in operation with the source range high flux trip operable under the following conditions:

- The reactor is shutdown.
- Fuel is in the reactor.
- Rod control system is enabled.

3.5.5 The high flux at shutdown alarm shall be operable when the reactor is shutdown with fuel in the reactor.

3.5.6 Criticality must be anticipated any time the control rods are being withdrawn or RCS boron dilution is in progress.

3.5.7 If the count rate on either source range channel unexpectedly increases by a factor of two or more during a boron concentration change the operation must be stopped immediately. The operation should remain suspended until the cause of the increase has been determined, and core reactivity has been evaluated by the Shift Supervisor.

3.5.8 Before withdrawing any rod bank from the fully inserted position, the group step counters and rod position indicators for that bank must be at zero steps.

3.5.9 With no RCP in operation, one reactor makeup water pump shall be tagged out to the Shift Supervisor to prevent an inadvertent dilution while on RHR.

3.5.10 At least one RCP must be in operation prior to performing any RCS dilution or boration except as noted in Step 3.5.10.1 below.
(SOER 94-02)

3.5.10.1 IF no RCP is in operation and at least one RHR pump is on service providing 3000 gpm flow, THEN chemicals may be added to the RCS provided an evaluation of the effects of a small volume dilution to the RCS with potentially inadequate mixing has been performed and with Shift Supervisor concurrence. The evaluation should consider shutdown margin for present conditions and the affected volume of RCS. Boron samples should be obtained and analyzed to ensure adequate shutdown margin is maintained

3.5.11 In Modes 5, 4, and 3 (RCS temp less than 541°F):

When the rod control system is capable of rod withdrawal, the RCS boron concentration must be maintained greater than or equal to the ARO critical boron concentration for the existing temperature (Curve 1A) [NEL-01-0093] [AIT # 2001201049] [AIT # 2001201049].

3.5.12 In Mode 3 (RCS temp ≥ 541°F):

When the rod control system is capable of rod withdrawal, the PR High Flux – Low Setpoint (25% RTP) trip is required to be available. [NEL-01-0093] [AIT # 2001201048]

3.5.13 Guidance in this procedure has the potential to impact reactivity. Close coordination with the control room operators is required to ensure proper reactivity management per NMP-OS-001, Reactivity Management Program. (AI 2008203128)

3.6 Atmospheric Relief Valve operation

3.6.1 During plant heat-up, IF the atmospheric relief valves are set for nominal system pressure of 1035 psig (POT setting of 8.25) in AUTO, THEN as RCS temperature approaches 547°F, the atmospheric relief valve response should be closely monitored to ensure no single atmospheric is more responsive than the rest. CR 2010118624

3.7 Restoration from IMP-0.7 and SG level (TE 592318)

- When restoring SSPS to normal configuration per FNP-1-IMP-0.7, DISABLE SSPS OUTPUTS FOR MODES 5 & 6, the SS must ensure that Steam Generator Lo-Lo bistables are not lit if the AFW Pumps are available.
- During SSPS restoration from IMP-0.7, AFW Pumps and FCV's will respond to actuation signals if the SG Lo-Lo- level bistables meet proper coincidence.
- At 28% SG NR level, AFW FCV's and TDAFWP steam admission valves will open.
- MDAFW Pump Auto/Defeat switches are only associated with the start from a trip of the both SGFP's and do not prevent a start from a Steam Generator Lo-Lo- level signal.
- The SS should obtain a peer check if a decision is made to waive the requirement for bistables *NOT ILLUMINATED* in that portion of FNP-1-IMP-0.7 restoration, (section 7.2).
- IF any Steam Generator Lo-Lo- level bistable is lit AND the SS waives the requirement for it to not be lit due to the AFW pumps not being available, THEN an Admin Tracking item should be initiated to ensure unintended AFW pump auto-start does not occur when the AFW pumps become available.

4.0 Technical Specifications

4.1 Technical Specifications for entering Mode 4 check list FNP-1-STP-35.1E must be completed prior to exceeding RCS temperature of 200°F, based on the absolute late date of the most limiting surveillance.

4.2 Technical Specifications for entering Mode 3, checklist FNP-1-STP-35.1D, must be completed prior to exceeding RCS temperature of 350°F, based on the absolute late date of the most limiting surveillance.

4.3 The RCS temperature and pressure, and pressurizer temperature shall be determined to be within limits by performing FNP-1-STP-35.0, Reactor Coolant System Pressure and Temperature/Pressurizer Temperature Limits Verification.

4.4 The flow rate through the RCS shall be determined to be greater than 3000 gpm prior to the start and at least once per hour during a reduction in RCS boron concentration by recording the required data per FNP-1-STP-1.0, Operations Daily and Shift Surveillance Requirements, miscellaneous section.

4.5 Mode 5 (loops filled) RHR requirements:

- Two trains of RHR are OPERABLE with one train in service.
- An alternative to this requirement allowed by Technical Specifications is "Three filled Reactor Coolant loops and at least two Steam Generator levels greater than or equal to 75% of wide range indication may be substituted for one operable RHR loop."
- The RCS loops must be intact (capable of being pressurized) and filled, otherwise gases can come out of solution and accumulate in the SG U-bend region preventing natural circulation cooling capability, which is the basis for this alternative.
- RCS loop operability requirements per Tech. Spec. 3.4.7 require a Steam Generator wide range level of greater than or equal to 75% wide range indication.

4.6 When in Mode 3 reactor coolant pump seal injection flow shall be within Technical Specification 3.5.5 limits.

4.7 In Mode 3, Tech Spec 3.3.3 requires 2 channels of RCS Hot Leg Temperature and RCS Cold Leg Temperature to be operable. The performance of RTD cross calibration testing makes the associated channel RCS temperature instruments inoperable. Tech Spec 3.3.4 requires Loop A RCS Hot Leg Temperature and RCS Cold Leg Temperature to be operable in Mode 3.

4.8 Operation of a train of RHR aligned in cooldown operation with RCS temperatures greater than 212°F will result in inoperability of the associated train of ECCS. One train of ECCS is required while in Mode 4. Mode 3 entry will be prohibited until all portions of RHR piping is less than 212°F. One train of ECCS must be operable in Mode 4. (TS 3.5.3) (CR 2010106118)

5.0 Instructions

5.1 IF any RCP is in operation, THEN **mark** step 0 N/A AND **proceed** to step 5.3.

_____

_____ / _____

NOTES

For pressurizer spray and pressurizer pressure control 1B is the preferred pump to start first. ☐

The Precautions and Limitations for starting a RCP should be reviewed in FNP-1-SOP-1.1. ☐

CAUTION

Prior to starting a RCP, consideration should be given to raising the 230 kV bus voltage such that the emergency 4160 volt buses are approaching the 4200 volt limit to preclude spurious RCP breaker trip. (AI2010200391) ☐

5.2 Start a Reactor Coolant Pump as follows:

5.2.1 **Verify** RHR loop suction valves OPEN prior to starting the first RCP during solid plant operation:

- 1C RCS LOOP TO 1A RHR PUMP Q1E11MOV8701A _____
- 1C RCS LOOP TO 1A RHR PUMP Q1E11MOV8701B _____
- 1A RCS LOOP TO 1B RHR PUMP Q1E11MOV8702A _____
- 1A RCS LOOP TO 1B RHR PUMP Q1E11MOV8702B _____

_____ / _____

5.2.2 IF a loss of RCS flow with solid plant condition occurs, THEN **refer to** FNP-1-UOP-1.1, Appendix 5, prior to starting an RCP with solid plant conditions. _____

NOTE

An oil lift pump may need to operate for several minutes (more than 5) before enough pressure is developed to actuate the pressure switch that will illuminate the white light. The length of run time may vary due to oil temperature, secured time and pressure switch sensitivities. (AI12011201221) ☐

5.2.3 **Start** a RCP OIL LIFT PUMP for the RCP to be started.

- Q1B41P002A _____
- Q1B41P002B _____
- Q1B41P002C _____

5.2.3.1 **Allow** the lift pump to run at least two minutes prior to starting the RCP. _____

5.2.3.2 **Verify** that the associated white indicator light is energized, signifying adequate oil pressure available. (greater than than 600 psig) _____

5.2.4 **Verify** VCT pressure greater than or equal to 18 psig. _____

5.2.5 **Verify** the following alarms clear for the pump to be started:

5.2.5.1 RCP THRM BARR CCW FLOW HI annunciator DD2. _____

5.2.5.2 CCW FLOW FROM RCP OIL CLRS LO annunciator DD3. _____

5.2.5.3 Standpipe annunciators clear.

DA1 1A RCP STANDPIPE LVL LO _____

DA2 1B RCP STANDPIPE LVL LO _____

DA3 1C RCP STANDPIPE LVL LO _____

5.2.5.4 Oil reservoir HI annunciators clear:

HG1 RCP 1A BRG UPPER/LOWER OIL RES HI LVL _____

HG2 RCP 1B BRG UPPER/LOWER OIL RES HI LVL _____

HG3 RCP 1C BRG UPPER/LOWER OIL RES HI LVL _____

5.2.5.5 Oil reservoir LO annunciators clear:

HH1 RCP 1A BRG UPPER/LOWER OIL RES LO LVL _____

HH2 RCP 1B BRG UPPER/LOWER OIL RES LO LVL _____

HH3 RCP 1C BRG UPPER/LOWER OIL RES LO LVL _____

5.2.6 **Verify** that each intermediate leg boron concentration is greater than or equal to the required cold shutdown boron concentration. Boron concentrations are recorded in step 2.4.20.3. _____

_____ / _____

5.2.7 **Verify** RCP SEAL WTR BYP Q1E21HV8142 is CLOSED. _____

5.2.8 **Adjust** SEAL WTR INJECTION HIK 186 as necessary to maintain seal injection flow of 6-8 gpm on the lowest indicating seal injection flow meter. _____

CAUTION
The Tech Spec maximum lift pressure for the RHR pump suction relief valves is 450 psig, however, due to setpoint tolerances these valves could lift as low as 427 psig. ☐

5.2.9 **Adjust** CHG FLOW FK 122 as required to smoothly raise RCS pressure. _____

5.2.10 WHEN RCS pressure greater than 100 psig, THEN **open** RCP SEAL LEAKOFF valves:

- Q1E21HV8141A _____
- Q1E21HV8141B _____
- Q1E21HV8141C _____

_____ / _____

CAUTION
Throttling RHR TO LTDN HX HIK 142 excessively can cause loss of ability to control pressure transients with LP LTDN PRESS PK-145. ☐

5.2.11 **Adjust** the following valves as necessary to maintain RCS pressure 325-375 psig.

- LP LTDN PRESS PK 145 _____
- RHR TO LTDN HX HIK-142 _____

5.2.12 **Perform** the following for the RCP to be started:

5.2.12.1 **Verify** RCP No. 1seal ΔP greater than 210 psid on the following indicators:

5.2.12.2 1A RCP #1SEAL PRESS PI-156A _____

5.2.12.3 1B RCP #1SEAL PRESS PI-155A _____

5.2.12.4 1C RCP #1SEAL PRESS PI-154A _____

_____ / _____

5.2.12.5 **Verify** RCP No. 1 seal leak rate is within the limits of Figure 2.

- RCP SEAL LKOF HIGH RANGE recorder N1E21FR154A _____
- 1A RCP SEAL LEAKOFF LOW RANGE indication FI-156B _____
- 1B RCP SEAL LEAKOFF LOW RANGE indication FI-155B _____
- 1C RCP SEAL LEAKOFF LOW RANGE indication FI-154B _____

_____ / _____

5.2.13 IF necessary, THEN **operate** RCP SEAL WTR BYP Q1E21HV8I42 in accordance with the following guidance: _____

- During RCS pressurization or during cooldown and depressurization, the number 1 seal bypass valve should be left closed. The number 1 seal bypass valve should only be opened under the following conditions:
  - The RCP bearing temperature (seal inlet temperature) or number 1 seal leak-off temperature approaches it's alarm setpoint,

    AND
  - The RCS is greater than 100 psig, but less than 1000 psig,

    AND
  - The number 1 seal leak-off valve is open,

    AND
  - The number 1 seal leak-off flow rate is less than 1 gpm,

    AND
  - The seal injection water flow rate to each pump is greater than 6 gpm.
- During RCS pressurization, the number 1 seal bypass valve and the number 1 seal leak-off valve should remain closed until the RCS pressure is 100 psig (minimum), at which time the bypass valve may be opened (if necessary) only after the number 1 seal leak-off valves have been opened.
- During normal operation, the bypass valve should remain closed.
- The seal bypass valve should never be opened during a loss of injection water.

5.2.14 **Verify** one of the following:

- Cold pressurizer level less than 24% _____

_____ / _____

Pressurizer level (LI-462) _____

OR

- All steam generator shell temperatures less than 50°F above the associated RCS cold leg temperature _____

_____ / _____

SG 1A TE3188D _____ RCS Cold Leg 1A _____

SG 1B TE3188E _____ RCS Cold Leg 1B _____

SG 1C TE3188F _____ RCS Cold Leg 1C _____

5.2.15 **Verify** RCP start will not exceed the maximum starting duty of the RCPs: _____

- Only one RCP is to be started at any one time. ☐
- After any running period allow a minimum a 30 minute idle period before attempting a restart. ☐
- After any attempted start failure, allow a minimum 30 minute idle period before attempting a restart. ☐
- After three starts or attempted starts have been made within a two hour period, allow a 60 minute idle period before attempting an additional start. ☐

5.2.16 **Perform** the following for the pump to be started:

5.2.16.1 **Verify** pressure is stabilized between 325-375 psig _____

5.2.16.2 **Verify** the oil lift pump has been started for at least 2 minutes.

- Q1B41P002A with white indicator light energized. _____
- Q1B41P002B with white indicator light energized _____
- Q1B41P002C with white indicator light energized _____

CAUTION

Starting an RCP will affect RCS heatup rate. The heat up limits set by Tech Specs PTLR Figure 2-1 must be adhered to. ☐

5.2.16.3 **Start** the designated reactor coolant pump; verify that all loop flow instruments show an increasing flow rate for the RCP started.

- 1A RCP, Q1B41P001A _____
- 1B RCP, Q1B41P001B _____
- 1C RCP, Q1B41P001C _____

5.2.16.4 **Verify** that RCP amperage decreases to a normal operating range of 900 amps cold and 700 amps hot for the RCP started.

- 1A RCP, RX COOLANT AMPS _____
- 1B RCP, RX COOLANT AMPS _____
- 1C RCP, RX COOLANT AMPS _____

5.2.16.5 **Verify** that the RCS LOOP FLOW LO annunciator is clear.

- 1A RCS LOOP FLOW LO annunciator EF1 is clear. _____
- 1B RCS LOOP FLOW LO annunciator EF2 is clear. _____
- 1C RCS LOOP FLOW LO annunciator EF3 is clear. _____

5.2.17 IF RCS is solid, THEN **adjust** CHG FLOW FK 122 to establish approximately 60 gpm letdown flow. _____

5.2.18 IF 1A or 1B RCP was started, THEN **open** the appropriate spray valve to re-circulate the pressurizer.

- 1A RCP LOOP SPR VLV PK 444C _____

_____ / _____

- 1B RCP LOOP SPR VLV PK 444D _____

_____ / _____

5.2.19 WHEN a minimum of one minute of RCP operation has elapsed, THEN **stop** the RCP OIL LIFT PUMP for the pump started:

- Q1B41P002A _____
- Q1B41P002B _____
- Q1B41P002C _____

NOTE

If additional RCP's are to be started, performance of the following step may be delayed until all RCP's are running. This is due to ALARA concerns for entering containment. ☐

5.2.20 **Verify** RCP termination box strip heaters are de-energized by performing the following for the running pumps: _____

- **Open** BKR 11, 1A RCP termination box strip heater, in 120 V 1G receptacle panel N1T51L002B (129 ft CTMT) to de-energize the strip heater for 1A RCP. ☐
- **Open** BKR 9, 1B RCP termination box strip heater, in 120 V 1G receptacle panel N1T51L002B (129 ft CTMT) to de-energize the strip heater for 1B RCP. ☐
- **Open** BKR 7, 1B RCP termination box strip heater, in 120 V 1G receptacle panel N1T51L002B (129 ft CTMT) to de-energize the strip heater for 1C RCP. ☐

5.3 **Perform** the following to accomplish the chemistry sampling requirements:

5.3.1 IF both trains of RHR are NOT in service, AND requested by CHM, THEN **start** the idle RHR pump per FNP-1-SOP-7.0, Residual Heat Removal System.

_____

_____ / _____

5.3.2 WHEN a minimum of five minutes of operation with a RCP and both trains of RHR in-service has elapsed (IF requested by CHM at step 5.3.1), THEN **notify** Chemistry to perform the following:

5.3.2.1 **Sample** the reactor coolant system per FNP-1-CCP-203, Chemistry And Environmental Group Considerations During Operational Transients.

_____

_____ / _____
CHEM

5.3.2.2 **Sample** the pressurizer liquid space per FNP-1-CCP-203, Chemistry And Environmental Group Considerations During Operational Transients.

_____

_____ / _____
CHEM

5.3.2.3 IF necessary, THEN **take** corrective action to return the coolant chemistry within specifications required by FNP-0-CCP-202, Water Chemistry Specifications.

_____

_____ / _____
CHEM

NOTE

If this start-up is for maintenance activities that did not require reducing RCS temperature less than 180 degrees, Section 5.4 is N/A. ☐

5.4 Prior to exceeding 180°F, **perform** the following:

5.4.1 **Adjust** RHR as required to maintain RCS temperature between175-180°F. _____

5.4.2 **Request** EM restore the auto close signal for the RHR Loop Suction Valves per FNP-1-SOP-7.0, Appendix 13. _____

5.4.3 **Clear** the caution tagout that was initiated per FNP-1-UOP-2.2 OR FNP-1-UOP-2.4 for the power supply breakers to RHR Loop Suction Valves. _____

5.4.4 **Verify** power supply breakers to RHR loop suction valves are CLOSED.

- BKR FU-T5, 1C RCS LOOP TO 1A RHR PUMP Q1E11MOV8701A. _____
- BKR FU-G2, 1A RCS LOOP TO 1B RHR PUMP Q1E11MOV8702A. _____
- BKR FV-V2, 1C RCS LOOP TO 1A RHR PUMP Q1E11MOV8701B _____
- BKR FV-V3, 1A RCS LOOP TO 1B RHR PUMP Q1E11MOV8702B. _____

_____ / _____

5.5 **Commence** Mode 4 surveillance requirements of FNP-1-STP-1.0, Operations Daily and Shift Surveillance Requirements _____

5.6 IF a steam space is already established in the pressurizer, THEN **mark** steps 5.7 through 5.11 N/A AND **proceed** to step 5.12. _____

5.7 **Verify** RCS chemistry is within the limits specified in FNP-0-CCP-202, Water Chemistry Specifications, prior to establishing a steam space in the pressurizer. _____

_____ / _____

5.7.1 WHEN RCS chemistry is within the specification of FNP-0-CCP-202, Water Chemistry Specifications, THEN one RHR pump may be shutdown if required. _____

NOTE

RCS oxygen concentration MUST be less than 0.1 ppm prior to exceeding 250°F. ☐

5.8 IF necessary to reduce to the RCS oxygen concentration below 0.1 ppm, THEN **perform** the following.

5.8.1 **Remove** the mixed bed demineralizer from service. _____

_____ / _____

NOTE

It is not necessary to hold following chemical addition. ☐

5.8.2 **Add** hydrazine to the RCS as necessary per FNP-1-SOP-2.5, RCS Chemical Addition, VCT Gas Control and Demineralizer Operation. _____

_____ / _____

5.9 **Verify** pressurizer spray valves CLOSED.

- 1A LOOP SPR VLV PK 444C. _____
- 1B LOOP SPR VLV PK 444D. _____

5.10 **Energize** the pressurizer heaters as follows:

5.10.1 **Place** the handswitch for the following heater groups to ON:

- 1A PRZR HTR GROUP BACKUP _____
- 1B PRZR HTR GROUP BACKUP _____
- 1C PRZR HTR GROUP VARIABLE _____
- 1D PRZR HTR GROUP BACKUP _____
- 1E PRZR HTR GROUP BACKUP _____

5.10.2 IF desired to maximize the output of the 1C PRZR HTR GROUP VARIABLE heaters, THEN **place** PK 444A in MANUAL with 65% demanded output. _____

NOTE

Continue with plant heat-up to 190-200°F while performing step 5.11. ☐

5.11 WHEN pressurizer temperature increases to the saturation temperature for 375 psig (approximately 442°F) as indicated by increasing RCS pressure or letdown flow, THEN **establish** a steam space in the pressurizer as follows:

5.11.1 **Decrease** charging flow to minimum. _____

5.11.2 **Adjust** SEAL WTR INJECTION HIK 186 as required to maintain 6-13 gpm seal flow to each RCP. _____

5.11.3 **Operate** pressurizer heaters and/or spray valves to maintain RCS pressure 325-375 psig.

- 1A PRZR HTR GROUP BACKUP ON-AUTO-OFF _____
- 1B PRZR HTR GROUP BACKUP ON-AUTO-OFF _____
- 1C PRZR HTR GROUP VARIABLE ON-AUTO-OFF _____
- 1D PRZR HTR GROUP BACKUP ON-AUTO-OFF _____
- 1E PRZR HTR GROUP BACKUP ON-AUTO-OFF _____
- 1B LOOP SPRAY VLV PK 444D _____
- 1A LOOP SPRAY VLV PK 444C _____

5.11.4 **Adjust** LP LTDN PRESS PK 145 to maintain approximately 120 gpm. _____

5.11.5 WHEN VCT level increases to 81%, THEN **verify** VCT HI LVL DIVERT VLV Q1E21LCV115A in the fully diverted position. _____

_____ / _____

5.11.6 IF desired, THEN **place** excess letdown in operation to expedite formation of a steam space in the pressurizer per FNP-1-SOP-2.7, Chemical and Volume Control System Excess Letdown. _____

5.11.7 WHEN pressurizer level reaches 21%, THEN **perform** the following:

5.11.7.1 **Place** CHG FLOW FK-122 in AUTO. _____

_____ / _____

5.11.7.2 **Verify** pressurizer level is maintained at approximately 21%. _____

NOTE

Performance of certain sections of STP-158, Reactor Coolant System Pressure Isolation Valve Leak Test, will require isolating an individual train of RHR. Ensure compliance with Technical Specifications and actions required for inoperable Low Temperature Overpressure Protection System (3.4.12) and an inoperable train of RHR (3.4.7) when applicable. Three filled and vented RCS loops, capable of being pressurized and at least two Steam Generators having levels greater than or equal to 75 % wide range indication (with an available source of makeup water) may be substituted for one RHR loop. ☐

5.12 IF the purpose of this shutdown has been for refueling OR flow has been put through the hot leg injection lines, THEN **perform** FNP-1-STP-158, Reactor Coolant System Pressure Isolation Valve Leak Test as follows:

NOTE

The pre-shift briefing will stress management's expectations of closely monitoring RCS temperature to prevent a mode change due to temperature rise, and the actions to be taken if temperature control becomes a problem. ☐

5.12.1 A pre-job briefing is held concerning performance of FNP-1-STP-158.0, Reactor Coolant System Pressure Isolation Valve Leak Test. _____

_____ / _____

5.12.2 **Station** OR **designate** personnel for the purpose of operating the RHR loop suction valve power supply breakers in the event the off service train of RHR is required to be placed in service. _____

5.12.3 **Secure** up to two of the three RCPs as necessary to control temperature. IF possible, THEN **maintain** B RCP running. _____

5.12.4 IF temperature control is still a problem after securing two RCPs, THEN **notify** the test coordinator to secure the test lineup AND **place** the train of RHR, which was being tested, in service. _____

5.13 **Review** the "Work In Progress File(s)" for any activities in progress that could effect the pending Mode change. TE 651930. _____

5.14 **Prior** to exceeding 200°F in the RCS the following items must be completed:

5.14.1 **Verify** RCS chemistry is within the limits specified in FNP-0-CCP-202, Water Chemistry Specifications. _____

_____ / _____

5.14.2 **Notify** the Facilities Group to remove covers from the ECCS sump suction screens. _____

5.14.3 **Record** on FNP-1-STP-35.1, Unit Startup Technical Specification Verification, Technical Specifications Surveillance Requirements for Mode 4 operation based on the absolute late date of the most limiting surveillance per one of the following check lists in FNP-1-STP-35.1:

- Checklist E, FNP-1-STP-35.1E, Mode 4 Surveillance Check List, _____

_____ / _____

OR

- Appendix A, Explanation Of Codes In Report _____

_____ / _____

5.14.4 The Shift Manager has granted permission for Mode 4 entry. (CR2010106404) _____

_____ / _____

NOTE

If substituting three filled Reactor Coolant loops and at least two Steam Generators having levels greater than or equal to 75% wide range indication for an inoperable RHR loop (as noted in Tech. Spec. 3.4.7), then a Steam Generator level of greater than or equal to 75% wide range must be used to take credit for those Steam Generators. ☐

5.14.5 IF in wet layup, THEN **coordinate** with Chemistry AND **begin** reducing steam generator level to establish approximately 80% wide range indication. _____

_____ / _____

5.14.6 IF required, THEN **remove** the nitrogen blanket from each steam generator per FNP-1-SOP-16.3, Steam Generator Filling and Draining. _____

_____ / _____

5.14.7 **Notify** ES that approach to 200°F in the RCS is imminent AND that necessary RTD cross calibration data required at temperatures of 250, 350, 450 and 540 degrees must be obtained. (AI 2009204992) _____

_____ / _____

5.14.8 **Perform** FNP-1-STP-10.1, ECCS MOV POWER ISOLATION VERIFICATION. _____

5.14.9 **Remove** tags AND **rack in** containment spray pumps.

- 1A Containment Spray Pump supply breaker Q1R15BKRDF11 (DF-11 CS PUMP 1A Q1E13M001A-A) _____
- 1B Containment Spray Pump supply breaker Q1R15BKRDG11 (DG-11 CS PUMP 1B Q1E13M001B-B) _____

5.14.10 WHEN RCS temperature is greater than 180°F, but prior to RCS temperature of 200°F, THEN **perform** the following to enable a maximum of two charging pumps to be capable of injecting into the RCS:

5.14.10.1 **Remove** tags AND **rack in** the charging pumps breakers removed from service (Mark N/A the pump to remain tagged):

- Q1R15BKRDF06 1A CHG PUMP Q1E21M001A-A _____
- Q1R15BKRDF07 1B CHG PUMP A TRN Q1E21M001B-AB _____
- Q1R15BKRDG07 1B CHG PUMP B TRN Q1E21M001B-AB _____
- Q1R15BKRDG06 1C CHG PUMP Q1E21M001C-B _____

5.14.10.2 **Verify** charging pump surveillances, STPs 4.1 through 4.3, are current per checklist FNP-1-STP-35.1E. _____

_____ / _____

5.14.11 **Remove** tag AND **rack in** the breaker for the RMW pump previously removed from service:

- Q1R17BKRFAF2, 1A REACTOR MAKEUP WATER PUMP Q1P12M001A-A _____
- Q1R17BKRFBM3, 1B REACTOR MAKEUP WATER PUMP Q1P12M001B-B _____

5.14.12 **Remove** tags AND **close** breakers for the CTMT sump to RHR pump suction valves:

- FU-R4 CTMT SUMP TO 1A RHR PUMP--Q1E11MOV8811A _____
- FU-V5 CTMT SUMP TO 1A RHR PUMP-- Q1E11MOV8812A _____
- FV-B5 CTMT SUMP TO 1B RHR PUMP-- Q1E11MOV8811B _____
- FV-T4 CTMT SUMP TO 1B RHR PUMP-- Q1E11MOV8812B _____

5.14.13 IF tygon hoses are installed, THEN **remove** all tygon hoses from all steam generator wide range level transmitters. _____

5.14.14 IF NOT previously performed, THEN **deactivate** CTMT main purge as follows:

5.14.14.1 **Verify** CTMT PURGE SUPP/EXH FANS & DAMPERS N1P13M002/1 Q1P13HV3203B & A handswitch on the MCB is in STOP. _____

_____ / _____

5.14.14.2 **Verify** CTMT PURGE DMPRS handswitch HS-3196 in CLOSE. _____

5.14.14.3 **Verify** CTMT PURGE DMPRS handswitch HS-3198 in CLOSE. _____

5.14.14.4 On Containment Purge indication panel N1H11ZI2111B **check** the following:

- Purge Supply Fan is OFF _____
- Purge Exhaust Fan is OFF _____
- HV-3197 CLOSED _____
- HV-3196 CLOSED _____
- HV-3198D CLOSED _____
- HV-3198A CLOSED _____
- HV-3198C CLOSED _____
- HV-3198B CLOSED _____
- HV-3203B CLOSED _____
- HV-3203A CLOSED _____

5.14.14.5 In Termination Cabinet Q1H25L008-A, Panel 1, **open** the following links (reference D-177236, 177237, 177204):

- 1TB1-19 _____ EM or I&C
- 1TB1-20 _____ EM or I&C
- 1TB1-22 _____ EM or I&C
- 1TB1-23 _____ EM or I&C
- 1TB1-60 _____ EM or I&C

5.14.14.6 In Termination Cabinet Q1H25L029-B, Panel 1, **open** the following link (reference D-177199):

- 1TB1-44 _____ EM or I&C

5.14.15 **Verify** the MSIVs have been TAGGED CLOSED to prevent steam being carried over to the turbine building, if conditions on the secondary side require a main steam clearance. _____

_____ / _____

NOTE

If this startup is not following a refueling outage and no work activities have taken place in the pressurizer cubicle, step 5.14.16 is N/A. ☐

5.14.16 **Ensure** critical insulation/lagging has been installed in the pressurizer cubicle (while the cubicle is still reasonably habitable), or exceptions have been approved by outage management. [Lessons Learned 6329] _____

_____ / _____

5.14.17 **Start** the containment dome recirculation fans in HIGH (LOW) speed.

- 1A CTMT DOME RECIRC FAN N1T40M001A _____
- 1B CTMT DOME RECIRC FAN N1T40M001B _____
- 1C CTMT DOME RECIRC FAN N1T40M001C _____
- 1D CTMT DOME RECIRC FAN N1T40M001D _____

5.14.18 **De-energize** the containment jib cranes.

- For Jib crane N1T31K004 open supply breaker N1R17BKRFCM4L _____
- For Jib crane N1T31K005 open supply breaker N1R17BKRFDH7L _____
- For Jib crane N1T31K006 open supply breaker N1R17BKRFCS3R _____

5.14.19 **Verify** R-11/12 in-service and aligned per FNP-1-SOP-45.0, Radiation Monitoring System. _____

5.14.20 **Verify** that RCS oxygen concentration is less than 0.1 ppm. _____
CHEM

_____ / _____

5.14.21 FNP-1-STP-1.0, Operations Daily and Shift Surveillance Requirements, is current for Mode 4. _____

5.14.22 **Start** the non-running RCPs per FNP-1-SOP-1.1, Reactor Coolant System. _____

_____ / _____

- Do not allow VCT pressure to decrease below 18 psig.
- Do not exceed the heat up rate specified in PTLR Figure 2-1.

CAUTIONS

- RHR system should not normally be isolated from the RCS until all RCS cold leg temperatures are greater than 275°F. The exception to this is found at step 5.17.2. ☐
- To prevent overheating of the RHR heat exchangers during the RCS heatup, CCW must be aligned to any RHR HX whose pump is running or that is supplying low pressure letdown. ☐
- Steam Generator level must be maintained greater than or equal to 75% wide range indication in at least one Steam Generator with an operating Reactor Coolant Pump prior to entering Mode 4 with RHR secured. This assumes that at least one train of RHR is operable and aligned for cooldown operation. ☐
- RHR pumps shall not be operated in cooldown operation at RCS temperatures greater than 212°F. If any RHR pump is operated in cooldown operation with RCS temperature greater than 212°F, then declare the associated train of ECCS inoperable, AND do not enter Mode 3 until all portions of RHR piping is less than 212°F. (CR 2010106118) ☐

5.14.23 IF RHR pumps are to be stopped, THEN **align** normal letdown as follows:

5.14.23.1 **Verify** that the CVCS Letdown flowpath through all available orifices is established. _____

NOTE

If possible when securing a RHR pump for the last time prior to Mode 4 entry, the pump shaft should be observed locally for smooth coast down of the pump. If the shaft exhibits jerky motion, stops abruptly, or unusual scraping or grinding noises are heard, it could be an indication of casing ring cap screws in contact with the pump impeller. SS should be notified immediately. (IN 2003-03, Vogtle LER 2-2002-01) ☐

5.14.23.2 **Verify** 1A (1B) RHR PUMP STOPPED. _____

5.14.23.3 Simultaneously, slowly **close** RHR TO LTDN HX HIK 142 while adjusting LP LTDN PRESS PK 145 in AUTO or MANUAL to attempt to maintain letdown flowrate approximately constant. _____

5.14.23.4 **Verify** the following valves CLOSED:

- 1A RHR HX TO CVCS LETDOWN ISO 1-RHR-V-8720A (Q1E11V013A). _____
- 1B RHR HX TO CVCS LETDOWN ISO 1-RHR-V-8720B (Q1E11V013B). _____

NOTE

The intent of the following substep is to monitor for any uncontrolled heatup of the RHR loop(s) after both pumps have been stopped. One train of RHR must remain operable for ECCS injection, thus the designated train RCS suction valves will be closed at Step 5.17.2.1 to prevent heatup above 212°F and the LTOP Tech Spec 3.4.12 will be entered. The train chosen to isolate should be coordinated with Step 5.14.25 for the pump which is chosen for defeating auto start capabilities. ☐

5.14.24 Prior to 210°F, **stop** the running RHR pump(s). _____

5.14.24.1 WHEN both RHR pumps STOPPED**, monitor** both trains of RHR HX Inlet and Outlet temperatures for any continuing, uncontrolled heatup coincident with continued RCS heatup. _____

NOTE

Operation of a train of RHR in cool down operation when RCS temperature is between 212°F and 350°F will result in the associated train of ECCS being declared inoperable. One train of ECCS must be operable in Mode 4. **(TS 3.5.3) (CR 2010106118)** ☐

5.14.25 **Defeat** the RHR Pump SI auto start per FNP-1-SOP-7.0, RESIDUAL HEAT REMOVAL SYSTEM for one RHR Pump. _____

Indicate pump defeated.

- 1A RHR Pump ☐
- 1B RHR Pump ☐

NOTE

If the current shutdown was for a refueling outage, a Hydrogen atmosphere in the VCT should not be established until after completion of FNP-1-STP-32.1, Accumulator Discharge Check Valves Leakage Test. ☐

5.15 WHEN plant conditions permit, THEN **establish** a Hydrogen atmosphere in the VCT as follows:

5.15.1 **Verify** that FNP-1-STP-32.1, Accumulator Discharge Check Valves Leakage Test, has been completed satisfactorily, or is not required for the current shutdown. _____

_____ / _____

5.15.2 **Coordinate** with Chemistry AND **establish** a hydrogen atmosphere in the VCT per FNP-1-SOP-2.5, RCS Chemical Addition, VCT Gas Control and Demineralizer Operation. _____

_____ / _____

5.16 WHEN RCS temperature reaches 200°F, THEN **perform** FNP-1-STP-61.0, Reactor Coolant Pump and RHR Loop Operability Verification. _____

NOTE

The intent of the following substeps is to monitor for any uncontrolled heatup of the RHR loop(s) after both pumps have been stopped. One train of RHR must remain operable for ECCS injection, thus the designated train RCS suction valves will be closed to prevent heatup above 212°F and the LTOP Tech Spec will be entered. The train chosen to isolate should be coordinated with Step 5.14.25 for the pump which is chosen for defeating auto start capabilities. ☐

CAUTIONS

- Operation of the atmospheric relief will affect RCS heat up rate. Ensure that RCS pressure is maintained 350-425 psig. ☐
- Operation of the SG atmospheric relief valves with a known primary to secondary leak requires implementation of FNP-0-CCP-645, Main Steam Environmental Release. If required by SG leakage, the Shift Radiochemist should be contacted in advance to allow generation of a release permit and to calculate projected dose rates. ☐

5.17 WHEN RCS temperature approaches 210°F, THEN **verify** both RHR pumps are off. (See caution prior step 5.14.23) {**AI2009210071**} _____

5.17.1 WHEN both RHR pumps STOPPED, **monitor** both trains of RHR HX Inlet and Outlet temperatures for any continuing, uncontrolled heatup coincident with continued RCS heatup. _____

NOTE

In the following step, one train of RHR must remain operable for ECCS and the opposite train of loop suctions must remain OPEN for LTOP Tech Specs. ☐

5.17.2 IF either train of RHR HX Inlet or Outlet temperature continues to rise, THEN prior to reaching 212°F on the train designated for ECCS injection per Step 5.14.25, **perform** the following for the RHR train which will remain operable for ECCS injection:

5.17.2.1 **Close** the designated pair of loop suction valves:

- 1C RCS LOOP TO 1A RHR PUMP Q1E11MOV8701A. _____
- 1C RCS LOOP TO 1A RHR PUMP Q1E11MOV8701B. _____

OR

- 1A RCS LOOP TO 1B RHR PUMP Q1E11MOV8702A. _____
- 1A RCS LOOP TO 1B RHR PUMP Q1E11MOV8702B. _____

5.17.2.2 **Enter** the LTOP LCO 3.4.12 for the isolated RHR loop. _____

5.18 **Notify** ES of approach to 250°F to enable collection of RTD cross calibration data. (AI 2009204992) _____

_____ / _____

5.19 WHEN RCS temperature is greater than 275°F, THEN **perform** the following to enable all charging pumps to be capable of injecting into the RCS:

5.19.1 **Remove** tags AND **rack in** any charging pumps breakers still removed from service (Mark N/A pumps previously tagged in):

- Q1R15BKRDF06 1A CHG PUMP Q1E21M001A-A _____
- Q1R15BKRDF07 1B CHG PUMP A TRN Q1E21M001B-AB _____
- Q1R15BKRDG07 1B CHG PUMP B TRN Q1E21M001B-AB _____
- Q1R15BKRDG06 1C CHG PUMP Q1E21M001C-B _____

5.20 **Commence** Mode 3 surveillance requirements of FNP-1-STP-1.0, Operations Daily and Shift Surveillance Requirements _____

CAUTION

Steam Generator level must be maintained greater than or equal to 75% wide range indication in at least one Steam Generator with an operating Reactor Coolant Pump while in Mode 4 with RHR secured. This assumes that at least one train of RHR is operable and aligned for cool down operation. ☐

5.21 As RCS temperature increases, **perform** the following:

5.21.1 IF it is desired to hold for steam generator chemical contaminant removal, THEN **perform** the following:

5.21.1.1 **Maintain** RCS temperature 335-345°F. _____

5.21.1.2 **Maintain** steam generator narrow range water level 61-69% using AFW and at least one S/G with an operating RCP must be maintained greater than or equal to 75% wide range level. _____

5.21.1.3 **Maintain** maximum allowable steam generator blowdown flow. _____

5.21.1.4 **Maintain** RCS temperature with Atmospheric Relief Valves. _____

CAUTION

If a steam generator is drained below 28% narrow range prior to completing the initial conditions of Appendix 1, an ESF auto-start of the AFW system will occur. ☐

5.21.1.5 IF it is desired to drain and refill the steam generators following chemical contaminant removal, THEN **refer to** Appendix 1. _____

_____ / _____

NOTE

Pressurizer Loop Seal Drains Q1B13V030A can be accessed from the intermediate platform inside the PZR cubicle. (Q1B13V030A does not have a handle; a wrench is required to operate this valve.) Q1B13V030B&C are accessed from the opening on the 155' elevation. ☐

5.21.2 **Verify** Pressurizer Loop Seal Drains TORQUED CLOSED.

- Q1B13V030A, 1A PRZR SAFETY RELIEF LOOP SEAL DRN ISO _____
- Q1B13V030B, 1B PRZR SAFETY RELIEF LOOP SEAL DRN ISO _____
- Q1B13V030C, 1C PRZR SAFETY RELIEF LOOP SEAL DRN ISO _____

_____ / _____

NOTE

The following step has an STP that is a Mode 1-3 requirement due every 18 months and must be performed prior to Mode 3. If the due date will be before the next refueling outage, this STP may be performed during the 340°F temperature hold. ☐

5.21.3 IF not performed in the previous 18 months and it will be due the next refueling outage, THEN **perform** FNP-1-STP-45.14, Pressurizer PORV Operability Test. _____

_____ / _____

NOTE

Performance of the following step is not required at this time; however, the main steam system should be placed in service prior to reaching 547°F Tavg. ☐

5.21.4 **Align** the main steam system per FNP-1-SOP-17.0, Main and Reheat Steam. _____

5.22 Prior to exceeding 350°F (entering Operational Mode 3) the following items must be completed:

CAUTION

The RCPs are not designed for start-stop operations. ☐

5.22.1 **Maintain** RCS temperature below 350°F by removing reactor coolant pumps from service while observing the following:

5.22.1.1 Before starting or stopping any reactor coolant pumps, **review** Precautions and Limitations in Section 3.2, in Section 3.3 and FNP-1-SOP-1.1. _____

5.22.1.2 **Maintain** at least one reactor coolant pump running. _____

5.22.1.3 IF required THEN **operate** the atmospheric relief valves as necessary. _____

5.22.2 Prior to performing step 5.23.3, **maintain** steam generator and reactor coolant system conditions as follows:

5.22.2.1 In Mode 4 **maintain** steam generator levels equal to or greater than 75% wide range indication in at least two RCS loops with a reactor coolant pump running is at least one of the loops. _____

5.22.2.2 Before entering Mode 3, **maintain** steam generator levels greater than or equal to 30% narrow range indication in at least two RCS loops with operating reactor coolant pumps. Only one reactor coolant pump is required if the rod control system is disabled. (Tech Spec 3.4.5) _____

5.22.3 WHEN RCS temperature greater than 275°F, THEN **align** RHR for ECCS Standby Alignment per FNP-1-SOP-7.0, Residual Heat Removal System. _____

_____ / _____

5.22.4 **Restore** the RHR Pump SI auto start that was defeated in step 5.14.25 per FNP-1-SOP-7.0, Residual Heat Removal System. _____

_____ / _____

5.22.5 **Perform** FNP-1-STP-11.14, RHR Mechanical Stops. _____

_____ / _____

5.22.6 **Verify** containment sump level wide range instrumentation.

- LQI-3594A ON-OFF-FULL REF switch in ON position
  Power ON light illuminated. _____

_____ / _____

- LQI-3594B ON-OFF-FULL REF switch in ON position
  Power ON light illuminated. _____

_____ / _____

5.22.7 **Review** the “Work In Progress File(s)” for any activities in progress that could effect the pending Mode change. TE 651930. _____

NOTE

To address concerns regarding the possibility of an inadvertent rod withdrawal while subcritical, which were detailed in NASL-00-016 the following criteria should be applied in Modes 3-6: If rod control is enabled, then RCS boron concentration must be maintained equal to or greater than the requirements of Curve 1A, unless reactor startup is imminent. If Rod Control is not enabled, then heatup and RCS dilution may proceed in parallel, so long as boron concentration is sufficient to insure shutdown margin requirements are met, and Power Range Excore NIS low power trip available. ☐

CAUTION

At least one RCP must be running prior to changing the boron concentration in the RCS. (SOER 94-02) ☐

5.22.8 IF necessary, THEN **conduct** a boron dilution of the RCS to one of the following conditions whichever is greater. [NEL-01-0093] [AIT #2001201049]

- Cold shutdown boron concentration _____

  _____ / _____

- ARO critical boron concentration (Curve 1A) _____

  _____ / _____

- Estimated critical boron concentration _____

  _____ / _____

5.22.9 IF not completed within last 24 hours, THEN **record** on FNP-1-STP-35.1, Unit Startup Technical Specification Verification, completion of Technical Specification Surveillance requirements for Mode 3 operation per check list FNP-1-STP-35.1D. _____

_____ / _____

5.22.10 The Shift Manager has granted permission for Mode 3 entry. (CR 2010106404) _____

_____ / _____

5.22.11 **Start** a CRDM cooling fan.

- 1A CRDM CLG FAN N1T47M001A _____
- 1B CRDM CLG FAN N1T47M001B _____

_____ / _____

5.22.12 WHEN all RCS cold leg temperatures are greater than 275°F, AND RHR system have been removed from operation per FNP-1-SOP-7.0, Residual Heat Removal System, THEN **perform** the following:

5.22.12.1 **Verify** 1A RCS LOOP TO 1B RHR PUMP Q1E11MOV8702A is CLOSED _____

5.22.12.2 **Verify** 1A RCS LOOP TO 1B RHR PUMP Q1E11MOV8702B is CLOSED _____

5.22.12.3 **Verify** 1C RCS LOOP TO 1A RHR PUMP Q1E11MOV8701A is CLOSED _____

5.22.12.4 **Verify** 1C RCS LOOP TO 1A RHR PUMP Q1E11MOV8701B is CLOSED _____

5.22.13 **Verify** the Inadequate Core Cooling Monitoring System in operation per FNP-1-SOP-68.0, Inadequate Core Cooling Monitoring System, with exceptions noted. _____

_____ / _____

5.22.14 **Place** the RCS solid control selector switch to the DEFEAT position. _____

5.22.15 WHEN RCP number 1 seal leak-off increases to 1 gpm for each pump, THEN **perform** the following:

5.22.15.1 IF RCP SEAL WTR BYP Q1E21HV8142 is open, THEN **close** the valve. _____

_____ / _____

5.22.15.2 **Verify** seal leak-off flow remains above 1 gpm. _____

_____ / _____

5.22.16 IF less than 2 RCPs are operating, THEN **verify** the rod control system is disabled for rod withdrawal prior to entering Mode 3. _____

_____ / _____

5.22.17 **Verify** AFW to steam generator stop valves OPEN:

- Q1N23MOV3350A, 1A SG STOP VLV _____
- Q1N23MOV3350B, 1B SG STOP VLV _____
- Q1N23MOV3350C, 1C SG STOP VLV _____

_____ / _____

5.22.18 **Verify** AFW to steam generator stop valves supply breakers are LOCKED OPEN. (Master "Z" Key)

- Q1N23MOV3350A breaker Q1R17BKRFUU4 _____
- Q1N23MOV3350B breaker Q1R17BKRFUU5 _____
- Q1N23MOV3350C breaker Q1R17BKRFUI2 _____

5.22.19 **Ensure** reactor coolant pump seal injection flows are within the limits of Technical Specification 3.5.5 prior to entering Mode 3. _____

_____ / _____

NOTES

- As RCS pressure increases, the operator must closely monitor RCP #1 seal leakoff for evidence of a shutdown seal actuation. Leakoff flow will trend up as RCS pressure increases. If a shutdown seal has actuated, it is expected that the upward trend will slow and begin to fall as seal dP reaches ~600-800 psid and the polymer ring begins clamping on the sleeve. ☐
- Accumulators must be unisolated prior to exceeding 1000 psig RCS pressure. ☐
- Accumulators are required to be operable in Mode 3 greater than 1000 psig RCS pressure. ☐

5.22.20 **Increase** RCS pressure to 925-975 psig, which must be completed before opening accumulator discharge MOVs per step 5.23.20.5. _____

_____ / _____

5.22.20.1 **Verify** that FNP-1-STP-32.1, Accumulator Discharge Check Valves Leakage Test, has been completed satisfactorily, or is not required for the current shutdown. _____

_____ / _____

5.22.20.2 **Verify** that RCP SEAL WTR BYP Q1E21HV8142 CLOSED prior to exceeding 1000 psig. _____

_____ / _____

NOTE

The supply breakers disconnect switches for the accumulator discharge valves are locked open at all times except when valve operation is required. ☐

5.22.20.3 **Obtain** a Master "Z" key from the Shift Support Supervisor. _____

5.22.20.4 **Unlock** and **close** the following disconnects:

- Q1R18B032-A - 1A ACCUM DISCH ISO Q1E21MOV8808A. _____
- Q1R18B031-A - 1C ACCUM DISCH ISO Q1E21MOV8808C. _____
- Q1R18B035-B - 1B ACCUM DISCH ISO Q1E21MOV8808B. _____

_____ / _____

5.22.20.5 **Open** the following valves:

- 1A ACCUM DISCH ISO Q1E21MOV8808A _____
- 1B ACCUM DISCH ISO Q1E21MOV8808B _____
- 1C ACCUM DISCH ISO Q1E21MOV8808C _____

5.22.20.6 **INDEPENDENTLY VERIFY** the following valves are OPEN:

- 1A ACCUM DISCH ISO Q1E21MOV8808A _____ IV
- 1B ACCUM DISCH ISO Q1E21MOV8808B _____ IV
- 1C ACCUM DISCH ISO Q1E21MOV8808C _____ IV

5.22.20.7 **Open** AND **lock open** the following breaker disconnects.

- Q1R18B032-A - 1A ACCUM DISCH ISO Q1E21MOV8808A _____
- Q1R18B031-A - 1C ACCUM DISCH ISO Q1E21MOV8808C _____
- Q1R18B035-B - 1B ACCUM DISCH ISO Q1E21MOV8808B _____

5.22.20.8 **INDEPENDENTLY VERIFY** the following breaker disconnects are LOCKED OPEN:

- Q1R18B032-A - 1A ACCUM DISCH ISO Q1E21MOV8808A _____ IV
- Q1R18B031-A - 1C ACCUM DISCH ISO Q1E21MOV8808C _____ IV
- Q1R18B035-B - 1B ACCUM DISCH ISO Q1E21MOV8808B _____ IV

5.22.21 **Perform** FNP-1-STP-31.0, Accumulator Motor Operated Valve Power Isolation Verification. _____

_____ / _____

5.22.22 Before entering Mode 3, **verify** steam generator levels greater than or equal to 30% narrow range indication in at least two RCS loops with operating reactor coolant pumps. Only one reactor coolant pump is required if the rod control system is disabled. (Tech Spec 3.4.5) _____

_____ / _____

5.22.23 **Notify** ES of approach to 350°F to enable collection of RTD cross calibration data. (AI 2009204992) _____

_____ / _____

NOTE

MOV 8706A & MOV 8706B are required to be closed with power locked out in Modes 4 and 5. These MOVs must be energized within 4 hours of entering Mode 3.
(Ref. SR 3.5.3.2 and other Administrative Controls). ☐

5.23 **Continue** to increase RCS temperature and pressure within limits of PTLR Figure 2-1 while limiting the differential pressure across the Steam Generator Tubes to less than 1600 psid. (AI 2007202326) _____

_____ / _____

NOTE

At least 5 gpm SGBD flow from each steam generator should be maintained to provide sufficient flow to sample system. ☐

5.23.1 IF desired, THEN **reduce** SGBD flow to ≈ 5 gpm per steam generator to enhance RCS heat-up. _____

_____ / _____

5.23.2 **Verify** FNP-1-STP-1.0, Operations Daily and Shift Surveillance Requirements, is current for Mode 3. _____

_____ / _____

NOTE

Step 5.25.2 must be performed within 4 hours after RCS temperature reaches 350°F. ☐

5.24 WHEN RCS temperature reaches 350°F, THEN **perform** the following:

5.24.1 **Verify** FNP-1-STP-61.0, Reactor Coolant Pump and RHR Loop Operability Verification, is current for Mode 3 (greater than or equal to 350°F). _____

5.24.2 Within 4 hours after RCS temperature exceeds 350°F, **unlock** AND **close** the following breakers:

- Q1R17BKRFVE4, 1B RHR HX TO CHG PUMP SUCT Q1E21MOV8706B _____
- Q1R17BKRFUF5, 1A RHR HX TO CHG PUMP SUCT Q1E21MOV8706A _____

5.24.3 **Open** the following breakers: (CR 2005103659)

- Q1R17BKRFVV3, 1A RCS LOOP TO 1B RHR PUMP Q1E11MOV8702B _____
- Q1R17BKRFVV2, 1C RCS LOOP TO 1A RHR PUMP Q1E11MOV8701B _____

5.24.4 **INDEPENDENTLY VERIFY** the following breakers are CLOSED:

- Q1R17BKRFVE4, 1B RHR HX TO CHG PUMP SUCT Q1E21MOV8706B _____ IV
- Q1R17BKRFUF5, 1A RHR HX TO CHG PUMP SUCT Q1E21MOV8706A _____ IV

5.24.5 **INDEPENDENTLY VERIFY** the following breakers are OPEN:

- Q1R17BKRFVV3, 1A RCS LOOP TO 1B RHR PUMP Q1E11MOV8702B _____ IV
- Q1R17BKRFVV2, 1C RCS LOOP TO 1A RHR PUMP Q1E11MOV8701B _____ IV

5.25 While continuing with the remaining steps, as the RCS heatup continues, **notify** ES of the following to enable collection of RTD cross calibration data. (AI 2009204992)

5.25.1 RCS temperature approaching 450°F. _____

_____ / ____

5.25.2 RCS temperature approaching 540°F. _____

_____ / ____

5.26 IF required, THEN prior to reaching 547°F **perform** the following in preparation for turbine generator and steam dump operation. IF steps are NOT required prior to 547°F, THEN performed as required.

5.26.1 **Place** the circulating water system in operation per FNP-1-SOP-26.0, Circulating Water System. _____

5.26.1.1 The Circ Water Make Up Control Valve, Q1P16V560, should operated in accordance with Appendix 1, SW to CW Canal LCV, Q1P16V560, Operation _____

_____ / _____

5.26.1.2 If desired, the make-up control valve can be adjusted to cause a slowly increasing canal level, and the Circulating Water Canal Isolation Valve, Q1P16V550, can be closed as required to reduce canal level to the lower end of the control band and then reopened. _____

_____ / _____

5.26.2 **Perform** main turbine lube oil pump and EH fluid pump operational checks per the following:

5.26.2.1 FNP-1-SOP-28.1 Section 4.1, Turbine Generator Operation. _____

_____ / _____

5.26.2.2 FNP-1-SOP-28.9 Section 4.1, EH Fluid System Operation. _____

_____ / _____

5.26.3 **Perform** steam generator feed pump pre-start test on 1A and 1B feed pumps per FNP-1-SOP-21.0, Condensate and Feedwater System. _____

_____ / _____

5.26.4 **Place** the condensate system in operation, using 1 condensate pump, per FNP-1-SOP-21.0, Condensate and Feedwater System. _____

_____ / _____

5.26.5 **Place** the gland sealing system in operation per FNP-1-SOP-28.4, Gland Sealing Steam System. _____

_____ / _____

5.26.5.1 **Verify** the Unit 1 condenser inlet, N1P20V548, CLOSED. _____

5.26.6 **Establish** condenser vacuum per FNP-1-SOP-28.5, Condenser Air Removal System. _____

_____ / _____

5.26.7 **Establish** nitrogen purge flow to the condenser per FNP-1-SOP-21.0, Condensate and Feedwater System. _____

_____ / _____

NOTE

Heaters will automatically de-energize and energize as the cooling tower fans are started and stopped if the heater breakers are closed per FNP-1-SOP-26.0A. ☐

5.26.8 At the 1A cooling tower local control station/panel, **perform** the following:

- **Start** fans on 600V LC 1U, if not already running. _____

  _____ / _____

- **Start** fans on 600V LC 1V, if not already running. _____

  _____ / _____

- **Start** fans on LC # 11, if not already running. _____

  _____ / _____

NOTE

The letdown flow will increase with increasing RCS pressure. ☐

5.27 Prior to reaching high letdown flow limit of 140 gpm, **perform** the following:

5.27.1 **Adjust** letdown pressure control valve controller PK-145 within the normal operating pressure band of 260-450 psig. _____

_____ / _____

5.27.2 **Isolate** a letdown orifice isolation valve to limit letdown flow to less than or equal to 135 gpm as required,

- LTDN ORIF ISO 60 GPM Q1E21HV8149B _____

_____ / _____

- LTDN ORIF ISO 60 GPM Q1E21HV8149C _____

_____ / _____

5.28 IF excess letdown was placed in operation, THEN **remove** from operation per FNP-1-SOP-2.7, Chemical and Volume Control System Excess Letdown. _____

NOTE

At least two Reactor Coolant Loops shall be operable and in operation with Steam Generator levels greater than or equal to 30% narrow range indication with the Rod Control System operational. If the Rod Control System is inoperable as provided in Tech Spec 3.4.5, only one Reactor Coolant Pump is required to be in operation. ☐

5.29 **Maintain** steam generator levels in the normal operating range (61-69%) by operation of the motor driven auxiliary feed pumps per FNP-1-SOP-22.0, Auxiliary Feedwater System. _____

5.30 IF this shutdown has been for refueling, THEN **perform** FNP-1-STP-32.1, Accumulator Discharge Check Valves Leakage Test. _____

_____ / _____

5.31 WHEN RCS pressure exceeds 2000 psig, THEN **verify** the following:

5.31.1 Pressurizer PRESS SI and PORV BLOCK P-11 annunciator HD2 is clear. _____

5.31.2 Pressurizer SAFETY INJECTION TRAIN A BLOCKED is clear on the BYP & PERMISSIVE status panel. _____

5.31.3 Pressurizer SAFETY INJECTION TRAIN B BLOCKED is clear on the BYP & PERMISSIVE status panel. _____

NOTE

Any throttle valve adjustments should be verified acceptable per SR 3.5.5.1 with the "strongest" and "weakest" charging pump supplying flow within 4 hours. Engineering Support can supply information as to the strongest and weakest pumps. If it is not feasible to run FNP-1-STP-8.0, RCP Seal Controlled Leakage Test, using either the strongest or weakest pump (i.e. pump not capable of running or breaker racked out), then, the surveillance should be run with the two available charging pumps and an admin LCO written for the inoperable pump to ensure FNP-1-STP-8.0, RCP Seal Controlled Leakage Test, is run when the pump is returned to service. ☐

CAUTION

After RCS pressure exceeds 2000 psig, any significant changes in charging flow, particularly charging pump swaps, shall be followed with a check of RCP seal flow, using the guidance for swapping charging pumps given in FNP-1-SOP-2.1, Chemical and Volume Control System Plant Startup and Operation. ☐

5.32 WHEN RCS pressure exceeds 2000 psig, THEN **perform** the following:

5.32.1 **Open** SEAL WTR INJECTION HIK 186 fully. _____

5.32.2 **Verify** seal injection flow to RCPs is within the limits of Technical Specification 3.5.5. _____

_____ / _____

5.32.3 IF required, THEN **adjust** RCP SEAL WATER INJ THROTTLE valves.

- Q1E21V116A 1A RCP SEAL WATER INJ THROTTLE VLV _____
- Q1E21V116B 1B RCP SEAL WATER INJ THROTTLE VLV _____
- Q1E21V116C 1C RCP SEAL WATER INJ THROTTLE VLV _____

5.32.4 **Verify** the RCP SEAL WATER INJ THROTTLE valves are sealed in position: (NRC Cmt. 0004355) (CR 2010113165 & 2010118146)

- Q1E21V116A 1A RCP SEAL WATER INJ THROTTLE VLV _____
- Q1E21V116B 1B RCP SEAL WATER INJ THROTTLE VLV _____
- Q1E21V116B 1B RCP SEAL WATER INJ THROTTLE VLV _____

5.32.5 **Independently verify** the RCP SEAL WATER INJ THROTTLE valves are sealed in position: (NRC Cmt. 0004355) (CR2010113165 & 2010118146)

- Q1E21V116A 1A RCP SEAL WATER INJ THROTTLE VLV _____
- Q1E21V116B 1B RCP SEAL WATER INJ THROTTLE VLV _____
- Q1E21V116C 1C RCP SEAL WATER INJ THROTTLE VLV _____

NOTE

FNP-1-STP-8.0, RCP Seal Injection Leakage Test (Step 5.35) must be performed within 4 hours of the RCS pressure stabilizing at greater than or equal to 2215 psig and less than or equal to 2255 psig. ☐

5.33 WHEN RCS pressure approaches normal operating pressure (2235 psig), THEN **perform** the following:

5.33.1 **Place** pressurizer backup heaters in automatic.

- 1A PRZR HTR GROUP BACKUP in AUTO _____
- 1B PRZR HTR GROUP BACKUP in AUTO _____
- 1D PRZR HTR GROUP BACKUP in AUTO _____
- 1E PRZR HTR GROUP BACKUP in AUTO _____

5.33.2 **Place** pressurizer spray valves in automatic.

- 1A LOOP SPR VLV PK 444C in AUTO. _____
- 1B LOOP SPR VLV PK 444D in AUTO _____

5.33.3 **Verify** RCS pressure maintained at the normal operating pressure. _____

5.34 Within 4 hours after the reactor coolant system pressure stabilizes at greater than or equal to 2215 psig and less than or equal 2255 psig, THEN **perform** FNP-1-STP-8.0, RCP Seal Controlled Leakage Test for the strongest AND weakest charging pumps.

- FNP-1-STP-8.0, RCP Seal Controlled Leakage Test for the strongest charging pump. _____

_____ / _____

- FNP-1-STP-8.0, RCP Seal Controlled Leakage Test for the weakest charging pump. _____

_____ / _____

5.35 As RCS heatup continues, **perform** the following:

5.35.1 Prior to reaching 541°F in the RCS, **ensure** the Power Range Flux Low Setpoint (25%RTP) trip is available, if the rod control system is enabled and capable of rod withdrawal. _____

_____ / _____

5.35.2 **Perform** FNP-1-STP-9.0, RCS Leakage Test if not performed within last 72 hours. _____

5.35.3 WHEN RCS temperature exceeds 545°F, THEN **verify** the following Steamline block lights clear on the Bypass and Permissive status panel:

- Steamline Isolation Safety Injection Train A _____

_____ / _____

- Steamline Isolation Safety Injection Train B _____

_____ / _____

5.35.4 Prior to reaching 547°F **perform** the following:

5.35.4.1 **Place** the steam dump system in the steam pressure mode per FNP-1-SOP-18.0, Steam Dump System, with the pressure controller set at 1005 psig setpoint. _____

_____ / _____

5.35.4.2 IF the steam dumps or main condenser are not available, THEN **maintain** the RCS between 545 and 549°F with the steam generator atmospheric relief valves. _____

_____ / _____

NOTE

IF no maintenance was performed on the TDAFWP AND the surveillance tests listed below are current, THEN step 5.36.5 is not applicable. ☐

5.35.5 **Perform** the following TDAFWP surveillance tests within 24 hours of steam generator pressures reaching greater than or equal to 1005 psig.

5.35.5.1 FNP-1-STP-22.23 Turbine Driven Auxiliary Feedwater Pump Trip and Throttle Valve Mechanism and Indication Test. _____

_____ / _____

5.35.5.2 FNP-1-STP-22.16, Turbine Driven Auxiliary Feedwater Pump Quarterly In-Service Test, and Operability Test. _____

_____ / _____

NOTE

Pressurizer Loop Seal Drains Q1B13V030A can be accessed from the intermediate platform inside the PZR cubicle. (Q1B13V030A does not have a handle; a wrench is required to operate this valve.) Q1B13V030B&C are accessed from the opening on the 155' elevation.

☐

5.35.6 IF PZR loop seal leakage is evident based on:

A review of PRT parameters:

- PRT LVL LI-470
- PRT TEMP TI-471
- PRT PRESS PI-472

OR

By pressurizer safety loop seal temperature indicators:

- TI-469 A PRZR CODE SAFETY TAILPIPE TEMP INDICATOR
- TI-467 B PRZR CODE SAFETY TAILPIPE TEMP INDICATOR
- TI-465 C PRZR CODE SAFETY TAILPIPE TEMP INDICATOR

THEN **torque shut** Pressurizer Loop Seal drain valves
AND **check** for leak-by.

- Q1B13V030A, 1A PRZR SAFETY RELIEF LOOP SEAL DRN ISO _____

  _____ / _____
- Q1B13V030B, 1B PRZR SAFETY RELIEF LOOP SEAL DRN ISO _____

  _____ / _____
- Q1B13V030C, 1C PRZR SAFETY RELIEF LOOP SEAL DRN ISO _____

  _____ / _____

NOTE

The following test is only required if the RCS had been opened for refueling or maintenance. ☐

5.35.7 WHEN reactor coolant temperature is at approximately Normal Operating Temperature (NOT), THEN **conduct** reactor coolant system leak test per FNP-1-SOP-1.4, Reactor Coolant System Leak Test. _____

_____ / _____

5.36 IF required, THEN **reduce** letdown flow to 60 gpm by the following:

5.36.1 **Close** one 60 gpm letdown orifice valve per FNP-1-SOP-2.1, Chemical and Volume Control System Plant Startup and Operation.

- Q1E21HV8149B, LTDN ORIF ISO 60 GPM _____
- Q1E21HV8149C, LTDN ORIF ISO 60 GPM _____

5.36.2 **Perform** FNP-1-STP-8.0, RCP Seal Controlled Leakage Test immediately to verify the requirements of Technical Specification SR 3.5.5.1. _____

_____ / _____

NOTE

At least two Reactor Coolant Loops shall be operable and in operation with Steam Generator levels greater than or equal to 30% narrow range indication with the Rod Control System operational. If the Rod Control System is inoperable as provided in Tech Spec 3.4.5, only one Reactor Coolant Pump is required to be in operation. ☐

5.37 **Maintain** steam generator levels 61-69% with the MDAFWP. _____

5.38 **Sample** steam generators AND **adjust** chemistry within the specifications for power operation required by FNP-0-CCP-202, Water Chemistry Specifications. _____

_____ / _____

_____
CHEM

_____ / _____

5.39 IF not already established, THEN **establish** a hydrogen atmosphere in the VCT. _____

5.40 **PRIOR to Mode 2**, flush the cation bed to remove suspended solids and to minimize the volume needed to borate the bed if required by CHEMISTRY. _____

_____ / _____

_____
CHEM

_____ / _____

5.41 IF required, THEN **perform** the following TDAFWP surveillance test procedures.

- FNP-1-STP-21.3 TDAFWP Steam Supply Valves In-Service Test _____
- FNP-1-STP-22.6 Auxiliary Feedwater Pump Train B Functional Test _____
- FNP-1-STP-22.7 Auxiliary Feedwater Pump Train A Functional Test _____
- FNP-1-STP-22.10 Turbine Driven Auxiliary Feedwater Pump Blackout Start Test _____
- FNP-1-STP-22.13 Turbine Driven Auxiliary Feedwater Pump Check Valves Flow Verification _____
- FNP-1-STP-22.20 TDAFW Pump Steam Admission Valves Air Accumulator Test _____

5.42 Return SGBD flow to normal per Chemistry requirements. _____

_____ / _____

_____
Shift Supervisor Review

6.0 RECORDS

Documents created using this procedure will become QA Records when completed unless otherwise stated. The procedures and documents are considered complete when issued in DMS.

QA Record (X)	Non-QA Record (X)	Record Generated	Retention Time	R-Type
X		FNP-1-UOP-1.1	LP	H06.055

Figure 1
Residual Heat Removal And Reactor Coolant Pump
Limitations During Heatup And Cooldown

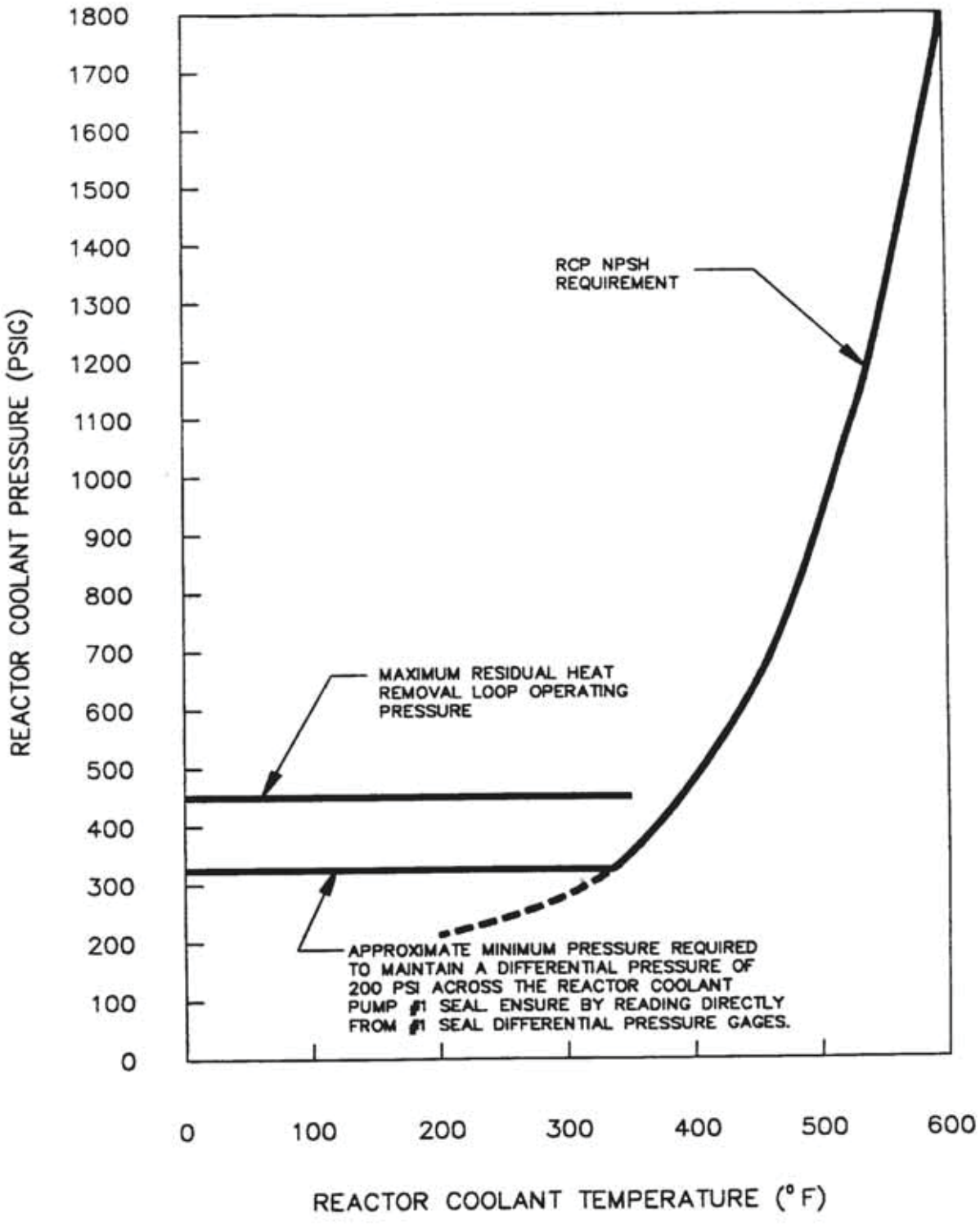
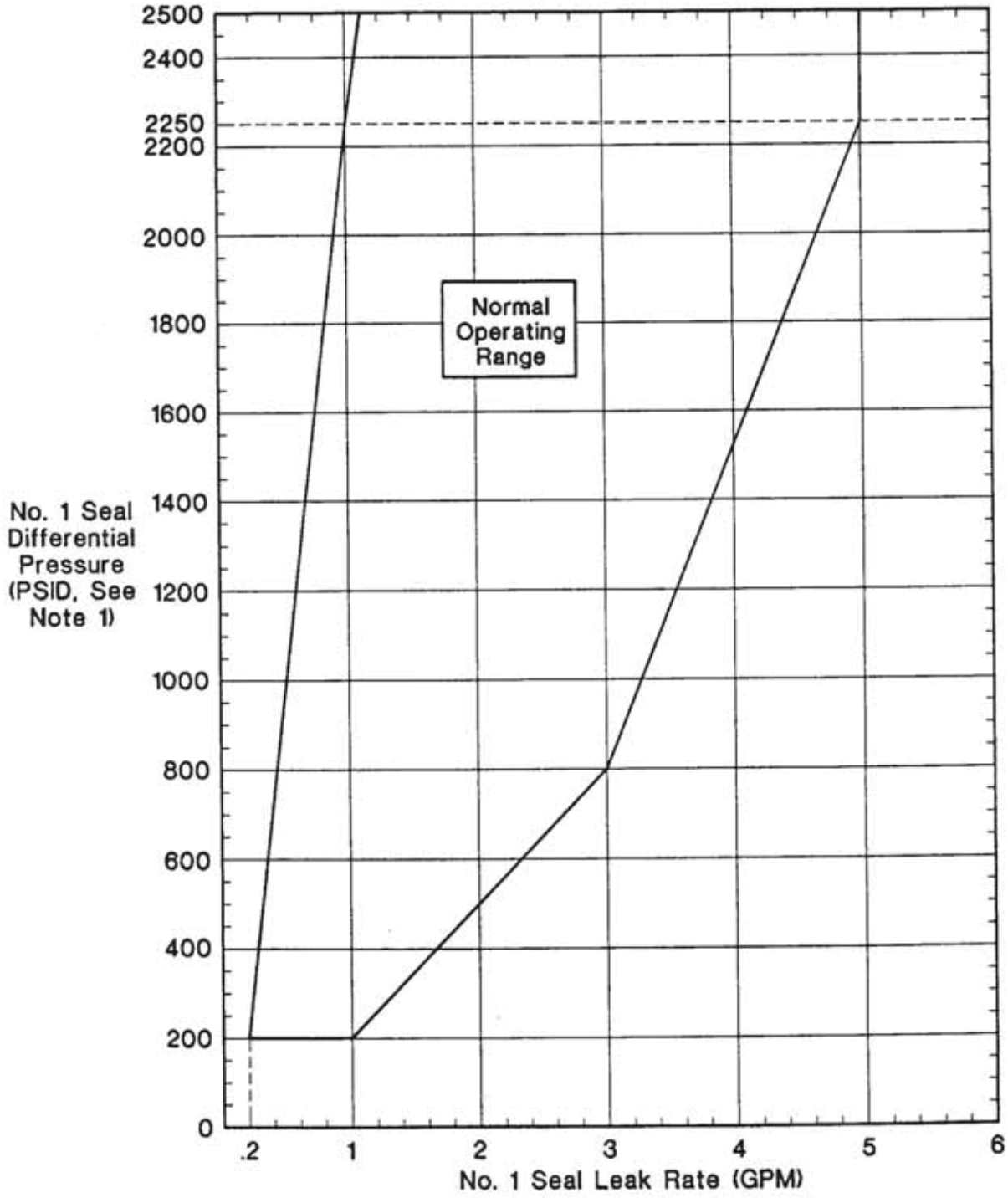


Figure 2
No. 1 Seal Normal Operating Range

NOTE

For No. 1 Seal differential pressure greater than 400 psid, use RCS pressure in psig.



APPENDIX 1

STEAM GENERATOR DRAINING AND REFILLING FOR CHEMICAL CONTAMINANT REMOVAL

Performed by: _____ Date _____

Reviewed by: _____ Date _____

This Appendix consists of 3 pages

APPENDIX 1
STEAM GENERATOR DRAINING AND REFILLING
FOR CHEMICAL CONTAMINANT REMOVAL
(Page 1 of 2)

1.0 Purpose

To provide guidance for Steam Generator draining and refilling for chemical contaminant removal during shutdown of Unit.

2.0 Initial Conditions

2.1 The version of this appendix has been verified to be the current version. (OR 1-98-498) _____

2.2 The version of this appendix has been verified to be the correct unit for the task. (OR 1-98-498) _____

3.0 Draining Steam Generators

3.1 **Verify** SGBD is in operation per FNP-1-SOP-16.1, Steam Generator Blowdown Processing System. _____

3.2 **Verify** SG wide range LT 477, LT 487 and LT 497 are in service and indicating on LR 477. _____

3.3 **Verify** the following have been defeated by completing Appendix 3:

3.3.1 AFW pump auto start. _____

3.3.2 SGBD isolation signals. _____

3.4 MSIVs are CLOSED per FNP-1-SOP-17.0, Main and Reheat Steam. _____

3.5 **Ensure** RHR loop and RCS loop operability requirements are met per Tech. Spec. 3.4.6 and 3.4.7. _____

NOTE

The following steps may be performed in any order ☐

3.6 IF nitrogen addition is desired, THEN **go to** FNP-1-SOP-16.3, the section for establishing and removing nitrogen pressure from steam generator 1A (1B, 1C). _____

APPENDIX 1
STEAM GENERATOR DRAINING AND REFILLING
FOR CHEMICAL CONTAMINANT REMOVAL
(Page 2 of 2)

NOTE

AFW FCVs will open on lo-lo SG level and TDAFW pump steam admission valves will open. ☐

3.7 **Drain** the steam generator(s) as desired per FNP-1-SOP-16.3, Steam Generator Filling and Draining using the following:

- Steam Generator Blowdown _____
- Steam Generator Shell Drain Pump _____

4.0 Refilling Steam Generator(s)

4.1 **Verify** SG wide range LT 477, 487 and 497 are in service. _____

4.2 **Verify** SG wide range LT 477, 487 and 497 are indicating on LR-477. _____

4.3 **Isolate** N_2 supply to the desired SG(s) per FNP-1-SOP-16.3. _____

4.4 **Verify** the auto-start of the 1A MDAFWP is defeated per Appendix 3. _____

NOTE

If SG level is maintained greater than 12%, filling and draining of the SG may be performed, as required to aid in decontamination of the secondary water. ☐

CAUTION

Do not add auxiliary feedwater to a SG if wide range level is less than 12% and RCS temperature is greater than or equal to 200°F. ☐

4.5 **Verify** that SG level is greater than 12% wide range. _____

4.6 **Fill** the SG per the instructions in the applicable section of FNP-1-SOP-16.3. _____

4.7 WHEN flushing is complete, THEN **fill** the SG to its normal level as determined by the Shift Supervisor using 1A MDAFWP per FNP-1-SOP-22.0, Auxiliary Fedwater System. _____

4.8 WHEN flushing is complete in all SGs AND SG levels are greater than 28% narrow range, THEN **perform** Appendix 4 to restore the MDAFW Pump auto-start capability. _____

APPENDIX 2

ALIGNING NITROGEN SUPPLY FOR STEAM GENERATOR
DRAINING AND FILLING FOR CHEMICAL CONTAMINANT REMOVAL
(DELETED)

Verified by: _____ Date _____

Performed by: _____ Date _____

Reviewed by: _____ Date _____

This Appendix consists of 0 pages

APPENDIX 3

DEFEATING THE AUXILIARY FEEDWATER PUMPS'
AUTO-STARTS AND SGBD ISOLATION

Verified by: _____ Date _____

Performed by: _____ Date _____

Reviewed by: _____ Date _____

This Appendix consists of 2 pages

APPENDIX 3
DEFEATING THE AUXILIARY FEEDWATER PUMPS'
AUTO-STARTS AND SGBD ISOLATION
(Page 1 of 2)

1.0 Purpose

To defeat the Auxiliary Feedwater Pump Auto-Starts and SGBD Isolation functions.

2.0 Initial Conditions

2.1 The version of this appendix has been verified to be the current version. (OR 1-98-498) _____

2.2 The version of this appendix has been verified to be the correct unit for the task. (OR 1-98-498) _____

3.0 Instructions

3.1 **Defeat** the MDAFWP's auto-start on a dual Main Feed Pump trip by verifying the following:

3.1.1 1A MDAFWP Auto-Defeat switch in DEFEAT _____

3.1.2 1B MDAFWP Auto-Defeat switch in DEFEAT _____

3.2 **Verify** TDAFWP TRIP & THRTL VLV Q1N12MOV3406 CLOSED. _____

3.3 **Defeat** the 1A MDAFWP auto-start on low-low SG level as follows:

3.3.1 In the SOLID STATE PROTECTION SYSTEM TRAIN "A" LOGIC CABINET, **place** the INPUT ERROR INHIBIT switch to INHIBIT. _____

3.3.2 In the SOLID STATE PROTECTION SYSTEM TRAIN "A" OUTPUT CABINET on the OUTPUT RELAY TEST PANEL, **place** the MODE SELECTOR switch to TEST. _____

3.3.3 In SOLID STATE PROTECTION SYSTEM TRAIN A OUTPUT CABINET (rear section), **have** I&C lift the black field lead from terminal #1 or #2 on terminal block TB 632 (Ref. D-177186/1, D-177357). _____ I&C

Wire No. _____

3.3.4 In the SOLID STATE PROTECTION SYSTEM TRAIN "A" OUTPUT CABINET on the OUTPUT RELAY TEST PANEL, **place** the MODE SELECTOR switch to OPERATE AND **verify** the OPERATE lamp is ON. _____

3.3.5 In SOLID STATE PROTECTION SYSTEM TRAIN A LOGIC CABINET, **place** the INPUT ERROR INHIBIT switch to NORMAL. _____

3.3.6 **Close** and **lock** SOLID STATE PROTECTION SYSTEM TRAIN A LOGIC CABINET and OUTPUT CABINET doors. _____

APPENDIX 3
DEFEATING THE AUXILIARY FEEDWATER PUMPS'
AUTO-STARTS AND SGBD ISOLATION
(Page 2 of 2)

3.4 **Verify** 1B MDAFWP supply breaker Q1R15BKRDG10, Racked Out. _____

3.5 **Have** EM defeat the SGBD isolation on low-low SG level by jumpering the following terminals in 1A MDAFWP supply breaker Q1R15BKRDF10 per NMP-MA-018, PLANT ELECTRICAL COMPONENT TEMPORARY CONFIGURATION CONTROL. (Ref. D-177186/1)

- Relay SGBX, contacts 5 and 6
  (Terminal Block TE, right side, Terminals 3 & 4) _____ EM
- Relay SGBX, contacts 7 and 8
  (Terminal Block TE, right side, Terminals 5 & 6) _____ EM
- Relay SGBX, contacts 9 and 10
  (Terminal Block TE, right side, Terminals 7& 8) _____ EM

3.6 **Have** EM defeat the SGBD sample isolation on AFW Pump auto-start by performing one of the following: (Ref. D-177186/1, D-177394/3, D-177844)

- In 1A MDAFWP breaker Q1R15BKRDF10, **open** link at Terminal Block TF, Terminal 3, for wire 95-7F. _____ EM

OR

- In 1A MDAFWP breaker Q1R15BKRDF10, **open** link at Terminal Block TF, Terminal 4, for wire 95-8F. _____ EM

3.7 **Verify** 1A MDAFWP supply breaker Q1R15BKRDF10 is racked in. _____

APPENDIX 4

REINSTATING THE AUXILIARY FEEDWATER PUMP
AUTO-START AND SGBD ISOLATION FUNCTIONS

Verified by: _____ Date _____

Performed by: _____ Date _____

Reviewed by: _____ Date _____

This Appendix consists of 2 pages

APPENDIX 4
REINSTATING THE AUXILIARY FEEDWATER PUMP
AUTO-START AND SGBD ISOLATION FUNCTIONS
(Page 1 of 2)

1.0 Purpose

To reinstate the Auxiliary Feedwater Pump Auto-Start and SGBD Isolation functions.

2.0 Initial Conditions

2.1 The version of this appendix has been verified to be the current version. (OR 1-98-498) _____

2.2 The version of this appendix has been verified to be the correct unit for the task. (OR 1-98-498) _____

2.3 Both MDAFW Pumps Auto-Defeat switches on the BOP are in DEFEAT. _____

3.0 Instructions

CAUTION
Ensure that all SG levels are in the normal operating range before performing this appendix. ☐

3.1 **Open** TDAFWP TRIP & THRTL VLV Q1N12MOV3406. _____

3.2 **Notify** EM to reinstate the SGBD isolation by removing jumpers as follows:

3.2.1 In 1A MDAFWP breaker Q1R15BKRDF10, **remove** jumper from SGBX relay contacts 5 and 6 (Terminal Block TE, right side, Terminals 3 and 4) per NMP-MA-018, PLANT ELECTRICAL COMPONENT TEMPORARY CONFIGURATION CONTROL. _____ EM

3.2.2 In 1A MDAFWP breaker Q1R15BKRDF10, **remove** jumper from SGBX relay contacts 7 and 8 (Terminal Block TE, right side, Terminals 5 and 6) per NMP-MA-018, PLANT ELECTRICAL COMPONENT TEMPORARY CONFIGURATION CONTROL. _____ EM

3.2.3 In 1A MDAFWP breaker Q1R15BKRDF10, **remove** jumper from SGBX relay contacts 9 and 10 (Terminal Block TE, right side, Terminals 7 and 8) per NMP-MA-018, PLANT ELECTRICAL COMPONENT TEMPORARY CONFIGURATION CONTROL. _____ EM

APPENDIX 4
REINSTATING THE AUXILIARY FEEDWATER PUMP
AUTO-START AND SGBD ISOLATION FUNCTIONS
(Page 2 of 2)

3.3 **Notify** EM to verify SGBD sample isolation is reinstated for 1A MDAFWP auto-start by verifying both of the following links inside breaker Q1R15BKRDF10 are closed:

3.3.1 **Close** link at Terminal Block TF, Terminal 3, for wire 95-7F. _____ EM

3.3.2 **Close** link at Terminal Block TF, Terminal 4, for wire 95-8F. _____ EM

3.4 **Rack** in 1B MDAFWP supply breaker Q1R15BKRDG10. _____

3.5 **Reinstate** the 1A MDAFWP supply auto-start on low-low SG level as follows:

3.5.1 In SOLID STATE PROTECTION SYSTEM TRAIN A LOGIC CABINET, **place** the INPUT ERROR INHIBIT switch to INHIBIT. _____

3.5.2 In SOLID STATE PROTECTION SYSTEM TRAIN A OUTPUT CABINET on the OUTPUT RELAY TEST PANEL, **place** the MODE SELECTOR switch to TEST. _____

3.5.3 In SOLID STATE PROTECTION SYSTEM TRAIN A OUTPUT CABINET (rear section), **have** I&C land the black field lead from terminal #1 or #2 on terminal block TB 632 that was lifted in Appendix3, step 3.3.(Ref. D-177186/1, D-177357). _____ I&C

3.5.4 In SOLID STATE PROTECTION SYSTEM TRAIN A OUTPUT CABINET on the OUTPUT RELAY TEST PANEL, **place** the MODE SELECTOR switch to OPERATE AND **verify** that the OPERATE lamp is on. _____

3.5.5 In SOLID STATE PROTECTION SYSTEM TRAIN A LOGIC CABINET, **place** the INPUT ERROR INHIBIT switch to NORMAL. _____

3.5.6 **Close** AND **lock** SOLID STATE PROTECTION SYSTEM TRAIN A LOGIC CABINET and OUTPUT CABINET doors. _____

3.6 **Verify** 1A MDAFWP supply breaker Q1R15BKRDF10 racked in. _____

APPENDIX 5

LOSS OF RCS FLOW
WITH SOLID PLANT CONDITIONS

Performed by: _____ Date _____

Reviewed by: _____ Date _____

This Appendix consists of 6 pages

APPENDIX 5
LOSS OF RCS FLOW
WITH SOLID PLANT CONDITIONS
(Page 1 of 6)

1.0 Purpose

To provide guidance for a loss of RCS flow with solid plant conditions.

2.0 Initial Conditions

2.1 The version of this appendix has been verified to be the current version. (OR 1-98-498) _____

2.2 The version of this appendix has been verified to be the correct unit for the task. (OR 1-98-498) _____

2.3 Plant is in Mode 5 with solid plant conditions and RCPs are tripped with seal injection temperature less than RCS temperature. _____

3.0 Instructions

CAUTION
If RCS flow is lost for greater than five minutes with seal injection flow while the plant is solid, the starting of a reactor coolant pump could cause a pressure excursion. ☐

3.1 IF the following conditions are met:

- No RCPs are running.
- Seal injection temperature is less than RCS temperature.
- FNP-1-SOP-1.1, Reactor Coolant System, requirements are satisfied.
- A reactor coolant pump has been idle for 30 minutes.

THEN **start** a RCP which has been idle for 30 minutes, within 5 minutes of the loss of flow condition per FNP-1-UOP-1.1, Steps 5.2.1 through 5.2.15. _____

3.2 IF plant startup is in progress with the following AND RCS chemistry is within specifications for RCS temperature greater than 180°F, THEN **perform** Section 3.3, IF NOT, **perform** Section 3.4 and 3.5. _____

APPENDIX 5
LOSS OF RCS FLOW
WITH SOLID PLANT CONDITIONS
(Page 2 of 6)

CAUTION
Do not perform this section if RCS temperature is less than 130°F. ☐

3.3 **Establish** a pressurizer steam space as follows:

3.3.1 **Adjust** charging and letdown flow as required to establish RCS pressure at 325-375 psig with LP LTDN PRESS PK 145 in AUTO. _____

3.3.2 **Energize** all pressurizer heaters.

- 1A PRZR HTR GROUP BACKUP ON _____
- 1B PRZR HTR GROUP BACKUP ON _____
- 1C PRZR HTR GROUP VARIABLE ON _____
- 1D PRZR HTR GROUP BACKUP ON _____
- 1E PRZR HTR GROUP BACKUP ON _____

3.3.3 **Maintain** RCS pressure 325-375 psig. _____

3.3.4 WHEN pressurizer temperature increases to the saturation temperature for 375 psig (approximately 442°F) as indicated by increasing RCS pressure or letdown flow, THEN **establish** a steam space in the pressurizer as follows:

3.3.4.1 **Decrease** charging flow to minimum. _____

3.3.4.2 **Adjust** SEAL WTR INJECTION HIK 186 as required to maintain 6-13 gpm seal flow to each RCP. _____

3.3.4.3 **Operate** pressurizer heaters as necessary to maintain RCS pressure 325-375 psig.

- 1A PRZR HTR GROUP BACKUP ON-AUTO OFF _____
- 1B PRZR HTR GROUP BACKUP ON-AUTO OFF _____
- 1C PRZR HTR GROUP VARIABLE ON-AUTO OFF _____
- 1D PRZR HTR GROUP BACKUP ON-AUTO OFF _____
- 1E PRZR HTR GROUP BACKUP ON-AUTO OFF _____

APPENDIX 5
LOSS OF RCS FLOW
WITH SOLID PLANT CONDITIONS
(Page 3 of 6)

3.3.4.4 **Adjust** LP LTDN PRESS PK 145 to maintain approximately 120 gpm. _____

3.3.4.5 WHEN VCT level increases to 81%, THEN **verify** VCT HI LVL DIVERT VLV Q1E21LCV115A in the fully diverted position. _____

3.3.4.6 IF desired, THEN **place** excess letdown in operation to expedite formation of a steam space in the pressurizer per FNP-1-SOP-2.7, Chemical and Volume Control System Excess Letdown. _____

NOTE

The preferred method for maintaining pressurizer level in the step below is with CHG FLOW FK-122 in AUTO. However, if auto control is not available or desired, then charging flow may be controlled in manual using the MA station, or using FCV-122 bypass control per FNP-1-SOP-2.1, Section 4.6. ☐

3.3.4.7 WHEN pressurizer level reaches 21%, THEN **place** CHG FLOW FK 122 in AUTO. _____

3.3.4.8 **Verify** pressurizer level is maintained at approximately 21%. _____

3.3.4.9 **Remove** excess letdown from operation if in service per FNP-1-SOP-2.7, Chemical and Volume Control System Excess Letdown. _____

3.3.4.10 **Adjust** LP LTDN PRESS PK 145 to establish the desired letdown flow. _____

3.3.5 IF RCS temperature is greater than 160°F, THEN **start** at least one RCP per FNP-1-SOP-1.1, Reactor Coolant System. _____

3.3.6 Startup of unit from cold shutdown to hot standby may be **performed** per FNP-1-UOP-1.1, Startup of Unit from Cold Shutdown to Hot Standby. _____

APPENDIX 5
LOSS OF RCS FLOW
WITH SOLID PLANT CONDITIONS
(Page 4 of 6)

NOTE

The provisions of FNP-1-UOP-1.1, Step 1.2, should be used to N/A conditions and steps already completed by this procedure. ☐

3.4 **Establish** RCS flow with solid plant conditions as follows:

CAUTION

RCS and pressurizer temperature must be less than 225°F. ☐

3.4.1 **Adjust** charging and letdown flow as necessary to reduce RCS pressure to 50-100 psig with LP LTDN PRESS PK 145 in AUTO. _____

3.4.2 WHEN RCS pressure is less than 100 psig, THEN **close** RCP SEAL LEAKOFF valves:

- Q1E21HV8141A. _____
- Q1E21HV8141B _____
- Q1E21HV8141C _____

3.4.3 **Maintain** seal injection flow. _____

3.4.4 **Place** the standby train of CCW in service per FNP-1-SOP-23.0, Component Cooling Water System. _____

3.4.5 **Maintain** low press letdown aligned to the train that was initially inservice while performing the next steps. _____

3.4.6 **Place** the standby train of RHR in service per FNP-1-SOP-7.0, Residual Heat Removal System. _____

APPENDIX 5
LOSS OF RCS FLOW
WITH SOLID PLANT CONDITIONS
(Page 5 of 6)

3.4.7 **Secure** CCW to the RHR Hx that low pressure letdown is aligned, to increase VCT by temperature to greater than 80°F.

3.4.7.1 IF A train is aligned, THEN **close** CCW TO 1A RHR HX Q1P17MOV3185A _____

3.4.7.2 IF B train is aligned, THEN **close** CCW TO 1B RHR HX Q1P17MOV3185B _____

3.4.7.3 IF additional heat input is required to raise VCT temperature, THEN **close** the following manual valves as required:

- Q1P17V034--SEAL WTR HX CCW INLET ISO _____
- Q1P17V031--LTDN HX CCW INLET ISO _____

3.4.8 **Adjust** the standby train of RHR as necessary to maintain RCS temperature less than 100°F. _____

3.4.9 **Maintain** RCS pressure at 50-100 psig for at least two hours to allow injection water to thermalize with the RCS loop temperature. _____

NOTE

The number of operating RCPs is limited to one at RCS temperatures less than 110°F, with the exception that a second pump may be started for the purpose of maintaining continuous flow while taking the operating pump out of service (Ref. TS 3.4.7 and 3.4.8). ☐

3.4.10 **Start** at least one RCP per FNP-1-UOP-1.1 step 5.2.1 through 5.2.15. _____

3.5 Returning system to normal:

3.5.1 **Establish** CCW to the RHR HX that Lo Press Letdown is aligned to by opening:

3.5.1.1 IF A train is aligned, THEN **open** CCW TO 1A RHR HX Q1P17MOV3185A _____

3.5.1.2 IF B train is aligned, THEN **open** CCW TO 1B RHR HX Q1P17MOV3185B _____

APPENDIX 5
LOSS OF RCS FLOW
WITH SOLID PLANT CONDITIONS
(Page 6 of 6)

3.5.2 IF CCW to the letdown and seal water heat exchangers manual valves were closed, THEN **open** the following valves.

- Q1P17V034--SEAL WTR HX CCW INLET ISO _____
- Q1P17V031--LTDN HX CCW INLET ISO _____

3.5.3 IF CCW to the letdown and seal water heat exchangers manual valves was secured, THEN **open** these valves. _____

3.5.4 IF desired, THEN **secure** the standby train of RHR per FNP-1-SOP-7.0, Residual Heat Removal System. _____

3.5.5 IF desired, THEN **secure** the standby train of CCW per FNP-1-SOP-23.0, Component Cooling Water System. _____

SOUTHERN COMPANY

FARLEY
Unit 1

SAFETY RELATED

FNP-1-SOP-1.1

Reactor Coolant System

VERSION 49.1

PROCEDURE LEVEL OF USE CLASSIFICATION PER NMP-AP-003	
CATEGORY	**SECTIONS**
Continuous	**ALL**
Reference	**NONE**
Information	**NONE**

Approval: David L Reed (Approved By) 12/08/2014 (Date)

Effective Date:

OPERATIONS
Responsible Department

VERSION SUMMARY
PVR 49.0 DESCRIPTION
Converted to new fleet template, deleted P&L that was for cycle 25 only, CR 787558, Added records section
PVR 49.1 DESCRIPTION
• Updated to force repagination • Corrected Unit number P&L 25.c, 4th bullet, Att 3 Step 34

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1.0 PURPOSE

This procedure provides Initial Conditions, Precautions, and instructions for the operation of the Reactor Coolant System.

2.0 INITIAL CONDITIONS

1. The Reactor Coolant System (RCS) has been filled, vented per FNP-1-SOP-1.3, Reactor Coolant System Filling And Venting - Vacuum Method, or FNP-1-SOP-1.11, Reactor Coolant System Filling And Venting - Dynamic Method, and is aligned per system check list FNP-1-SOP-1.1A with exceptions noted. Pressurizer spray valves Q1B31PCV444C and Q1B31PCV444D may be in manual or automatic control. ☐

2. The electrical distribution system is energized and aligned for normal operation per FNP-1-SOP-36.0, Plant Electrical Distribution Line-Up, with exceptions noted. ☐

3. The compressed air system is aligned and in service per FNP-1-SOP-31.0, Compressed Air System. ☐

4. The Service Water System (SW) is aligned and in service for normal operations per FNP-1-SOP-24.0, Service Water System. ☐

5. Component Cooling Water (CCW) is supplying Reactor Coolant Pumps per FNP-1-SOP-23.0, Component Cooling Water System. ☐

6. The reactor coolant pressure relief system and Reactor Coolant Drain Tank (RCDT) are available to receive discharge from the RCS per FNP-1-SOP-1.2, Reactor Coolant Pressure Relief System, and FNP-1-SOP-50.0, Liquid Waste Processing System. ☐

7. The Pressurizer (PRZR) heater distribution panels are aligned per system check list FNP-1-SOP-1.1B, with exceptions noted. ☐

8. CVCS charging (CHG) and letdown (LTDN) flows have been established and seal water is being supplied to RCP's in accordance with FNP-1-SOP-2.1, Chemical and Volume Control System Plant Startup And Operation. ☐

3.0 PRECAUTION AND LIMITATIONS

1. The RCS (except the pressurizer) shall be limited to a maximum heatup of 100°F in any one hour period and a maximum cooldown of 100°F in any one hour period at all times. ☐

2. The pressurizer temperature shall be limited to a maximum cooldown of 200°F in any one hour period, a maximum heatup of 100°F in any one hour period, and a maximum spray water temperature differential of 320°F at all times. ☐

3. A Residual Heat Removal (RHR) pump or a RCP must be operating to provide reactor coolant recirculation and thorough mixing during boron concentration changes, chemical addition or any time the RCS temperature exceeds 140°F.

   a. Verify the desired boron concentration in the RCS and PRZR has been achieved prior to securing the only running RCP. (**SOER 94-02)** ☐

   b. At least one RCP must be in operation prior to performing any RCS dilution or boration except as noted in Precaution and Limitation 3.c below. (**SOER 94-02)** ☐

   c. IF no RCP is in operation and at least one RHR pump is on service providing 3000 gpm flow, THEN chemicals may be added to the RCS provided an evaluation of the effects of a small volume dilution to the RCS with potentially inadequate mixing has been performed and with Shift Supervisor concurrence. The evaluation should consider shutdown margin for present conditions and the affected volume of RCS. Boron samples should be obtained and analyzed to ensure adequate shutdown margin is maintained. ☐

4. RCS pressure and temperature are limited to maximum of 375 psig and 350°F respectively when the RHR system is valved into the RCS. ☐

5. RCP's shall not be operated continuously until the RCS has been filled and vented in accordance with FNP-1-SOP-1.3, Reactor Coolant System Filling And Venting - Vacuum Method, or FNP-1-SOP-1.11, Reactor Coolant System Filling And Venting - Dynamic Method. ☐

6. DO NOT attempt to start a RCP unless its oil lift pump has been delivering oil to the upper thrust shoes for at least two minutes. Observe the oil lift pumps indicating lights to verify correct oil pump motor operation and oil pressure. The oil lift pumps should run at least 1 minute after the RCP's are started. An interlock will prevent starting a RCP until 600 psig oil pressure is established. ☐

7. Shift Supervisor's approval must be obtained prior to removing any seal wires or changing the position of any throttle valves. ☐

8. RCP seal water injection flow of 6 gpm or CCW to the RCP thermal barrier must be continuously supplied when RCS temperature exceeds 150°F. ☐

3.0 PRECAUTION AND LIMITATIONS (continued)

9. Maintain RCP CCW and seal injection water supply temperature less than 105°F and 130°F respectively. ☐

10. IF CCW flow to the RCP motor bearing oil coolers is lost, THEN pump operation may be continued until the motor upper or lower bearing temperature reaches 195°F (approximately 2 minutes after cooling water flow stops). ☐

11. For RCP operations, a pressure differential of 210 psid must be maintained across RCP No. 1 seals. ☐

12. The following precautions apply in the case of a RCP #1 seal failure.

    - DO NOT restart an RCP with an indicated No. 1 seal failure. ☐
    - Refer To FNP-1-ARP-1.4, Main Control Board Annunciator Panel "D", for guidance if No. 1 seal leakoff flow is abnormally low (Ann. DC1) or abnormally high (Ann. DC2). ☐

13. The No. 1 seal bypass valve should NOT be opened unless either the pump bearing temperature (seal inlet temperature) or the No. 1 seal leakoff temperature approaches its alarm level. The No. 1 seal bypass valve should then be opened only if all of the following conditions are met:

    - Reactor coolant system pressure is greater than l00 psig AND less than l000 psig. ☐
    - No. 1 seal leakoff valve is open. ☐
    - No. 1 seal leakoff flowrate is less than one gpm. ☐
    - Seal injection water flow rate to each pump is greater than 6 gpm. ☐

14. For RCP operations, the required minimum back pressure of 15 psig on the RCP No. 1 seals is ensured by maintaining a pressure of at least 18 psig in the VCT. ☐

15. An oil lift pump may need to operate for several minutes (more than 5) before enough pressure is developed to actuate the pressure switch that will illuminate the white light. The length of run time may vary due to oil temperature, secured time and pressure switch sensitivities. **(AI12011201221)** ☐

16. Following a change of boron concentration of 50 ppm or greater in the RCS, the PRZR spray must be operated to equalize the concentration throughout the system. Automatic operation of the spray should be initiated by manual operation of the PRZR heaters when there is a bubble in the PRZR. ☐

3.0 PRECAUTION AND LIMITATIONS (continued)

17. The following precautions apply to the operation of the RCP's:

    - IF all RCP's have been idle for more than 5 minutes with seal water flow established during solid plant operations, THEN Refer To FNP-1-UOP-1.1, Startup Of Unit From Cold Shutdown To Hot Standby, Attachment 5, prior to starting an RCP. ☐
    - At least one RCP should be running when the RCS temperature is greater than 160°F. ☐
    - The number of operating RCPs is limited to one at RCS temperatures less than 110°F, with the exception that a second pump may be started for the purpose of maintaining continuous flow while taking the operating pump out of service. ☐
    - Verify open 1C and 1A RCS LOOP TO 1A AND 1B RHR PUMP valves Q1E11MOV8701A and B and Q1E11MOV¬8702A and B prior to starting an RCP during solid plant operation. ☐
    - IF one or more of the RCS cold leg temperatures is less than 275°F, THEN a RCP shall not be started unless the PRZR water volume is < 24% wide range cold PRZR level indication OR the secondary water temperature of each steam generator is < 50°F above each of the RCS cold leg temperatures. ☐

18. The RCP's are not designed for "start stop" operations. Too frequent starting may damage the motor windings. To prevent such damage, the following maximum starting duty should be observed:

    - Only one RCP is to be started at any one time. ☐
    - After any running period OR after any attempted start that fails, allow a minimum 30 minute idle period before attempting a restart. ☐
    - DO NOT exceed three starts or attempted starts in a two hour period. IF three starts OR attempted starts have been made within a two hour period, THEN allow a 60 minute idle period before attempting an additional start. ☐

19. Continuous spray line flow is provided by normal leakage past the seat of the spray valves. This minimum flow will prevent the spray and surge lines from cooling below operating temperature and will also aid in maintaining uniform water chemistry and temperature conditions within the PRZR. ☐

3.0 PRECAUTION AND LIMITATIONS (continued)

20. To minimize temperature transients to the PRZR during plant heatup or cooldown operations, the following precautions should be observed when PRZR spray flow is initiated:

    - IF the temperature difference between the PRZR and the spray fluid is greater than 320°F, THEN spray should not be used. ☐

    - Auxiliary spray should only be used during plant cooldown. Auxiliary spray flow should be initiated slowly by opening RCS PRZR AUX SPR Q1E21HV8145 (Q1E21V245) and gradually increasing CHG line flow. ☐

21. IF CCW will be secured to the RCP motor oil coolers for longer than 2 months, THEN contact Maintenance to have the oil coolers drained and dried per RCP Technical Manual Technical Bulletin 81-02. ☐

22. IF an RCP is to be secured for greater than one month, THEN its termination box strip heaters should be energized. ☐

23. Prior to starting a RCP, consideration should be given to raising the 230 kV bus voltage such that the emergency 4160 volt buses are approaching the 4200 volt limit to preclude spurious RCP breaker trip. (AI2010200391) ☐

24. Guidance in this procedure has the potential to impact reactivity. Close coordination with the control room operators is required to ensure proper reactivity management per NMP-OS-001, Reactivity Management Program. **(AI 2008203128)** ☐

25. The following precautions apply to the RCP seals:

    a. It is critical that the alarms indicating loss of all seal cooling are heeded and the RCP(s) immediately tripped. There is no way to prevent a shutdown seal from actuating. The shaft must be stopped before the shutdown seal actuates, otherwise it will not seal properly. The greater the No. 1 seal leak off at the moment cooling is lost, the faster the RCP must be tripped to assure the shaft is stopped. A 5 gpm leaking No. 1 seal requires the RCP to be tripped within 2 minutes of losing CCW and seal injection. ☐

    b. For a motor trip that is performed as a response to a Loss of All Seal Cooling event, the oil lift MUST be OFF. Having the oil lift system on will delay the RCP shaft from coming to a complete stop. The SHIELD Shutdown Seal is designed to seal on a stationary shaft. Operating the oil lift system jeopardizes the protection the SHIELD would otherwise provide. ☐

3.0 PRECAUTION AND LIMITATIONS (continued)

25. (continued)

c. Refer to FNP-1-AOP-4.1, Abnormal Reactor Coolant Pump Seal Leakage, when any of the following conditions exist:

- Operator determination that a loss of all seal cooling to one or more RCPs has occurred. ☐
- Annunciator DC2, RCP #1 SEAL LKOF FLOW HI, is in alarm. Alarm setpoint is 5.0 GPM. ☐
- Annunciator DC1, RCP #1 SEAL LKOF LO, is in alarm. Alarm setpoint is 0.95 GPM. ☐
- Annunciators DA5, DB5, OR DC5; 1A(1B,1C) RCP #2 SEAL LKOF FLOW HI, is in alarm. Alarm setpoint is 0.75 GPM. ☐
- Annunciator DC3 RCP #1 SEAL LO ΔP is in alarm. ☐

d. IF a RCP's Lower Seal Water Bearing temperature reaches 225°F, THEN that RCP must be shutdown immediately. ☐

e. If at any time the seal package reaches 250°F, it is likely the shutdown seal has actuated. If #1 leakoff temperature of 235ºF is reached, the RCP trouble-shooting guide must be referenced to determine if the shutdown seal has actuated. Westinghouse should be contacted for further guidance in determining the status of the shutdown seal. ☐

f. If 250ºF is exceeded, the shutdown seal must be replaced. If 250ºF is exceeded while the shaft was rotating, until it is replaced the operator is to assume the shutdown seal has actuated and that it cannot be relied upon in a loss of all seal cooling event. ☐

g. The shutdown seal is a thermally actuated device. Caution shall be taken if welding or machining near the seal housing with the seals still installed. Heat created by these operations may elevate the temperature of the shutdown seal to the point of actuation. A fire in the proximity of the seal housing may also result in the shutdown seal actuating. ☐

h. It is unlikely that the inadvertent actuation of a shutdown seal on an operating RCP at NOT/NOP would result in a leak tight seal (immediate drop to 0 gpm leakoff followed by recovery to 1-1.5 gpm over 5-30 seconds). It is expected #1 seal leakoff flow will steadily decrease to below the alarm set point over a 10-30 minute period. Westinghouse should be contacted for further guidance in determining the status of the shutdown seal. ☐

3.0 PRECAUTION AND LIMITATIONS (continued)

25. (continued)

i. Closure of the #1 seal leakoff line will impede the operator's ability to determine if the shutdown seal has actuated. Alternate means such as calculated flow into the RCDT must be used. ☐

j. Isolating cooling to the seals (CCW and seal injection) too early during a plant shutdown could cause the SDS to actuate. Without cooling to the RCP seal package, the heat stored in the RCP can be conducted through its housing to the SDS. ☐

k. Do not restart an RCP with an indicated No. 1 seal failure. ☐

l. Prior to restoring pump to operation after being secured due to high temperature limitations, the SDS must be evaluated. If the temperature exceeded 250°F it is likely the SDS actuated and must be replaced. ☐

m. Maintain RCP CCW and seal injection water supply temperature less than 105°F and 130°F respectively. ☐

n. RCP seal water injection flow of 6 gpm or CCW to the RCP thermal barrier must be continuously supplied when RCS temperature exceeds 150°F. ☐

o. After any significant change in charging flow, the RCP seal injection flow should be checked and adjusted, as necessary, to maintain injection flow rates between 6 gpm and 13 gpm to each RCP. ☐

p. For RCP operations, the required minimum back pressure of 15 psig on the RCP No. 1 seals is ensured by maintaining a pressure of at least 18 psig in the VCT. ☐

q. For RCP operations, a pressure differential of 210 psid must be maintained across RCP No. 1 seals. ☐

4.0 INSTRUCTIONS

NOTES

- Initial startup of a RCP will be performed in accordance with FNP-1-UOP-1.1, Startup Of Unit From Cold Shutdown To Hot Standby, OR FNP-1-SOP-1.3, Reactor Coolant System Filling And Venting. FNP-1-UOP-1.1, Startup Of Unit From Cold Shutdown To Hot Standby, covers the initial startup of a RCP with the reactor coolant system in solid water operation and ensures all pumps are running prior to entry into mode 4. Starting of additional pumps may be performed by this procedure following the start of the first RCP. ☐
- Initial startup of a RCP may also be performed during Plant Shutdown per this procedure (FNP-1-SOP-1.1) when sent here from FNP-1-UOP-2.2, Shutdown Of Unit From Hot Standby To Cold Shutdown, Attachment 5. FNP-1-UOP-2.2, Attachment 5 references this procedure (FNP-1-SOP-1.1) to start a RCP during shutdown, either solid plant or with a bubble in the pressurizer. ☐

CAUTION

Prior to starting a RCP, consideration should be given to raising the 230 kV bus voltage such that the emergency 4160 volt buses are approaching the 4200 volt limit to preclude spurious RCP breaker trip. **(AI2010200391)** ☐

4.1 1A RCP STARTUP.

1. **Verify** RCP seal flow established per FNP-1-SOP-2.1, Chemical And Volume Control System Plant Startup And Operation. ☐
2. **Verify** VCT pressure > 18 psig. ☐
3. IF RHR is aligned to the RCS, THEN **verify** RCS pressure is 325-375 psig. ☐
4. IF RHR is NOT aligned to the RCS, THEN **verify** RCS pressure ≥ 350 psig. ☐
5. **Verify** that the 1A RCP STANDPIPE LVL LO annunciator DA1 is clear. ☐
6. **Verify** that the RCP THRM BARR CCW FLOW HI annunciator DD2 is clear. ☐
7. **Verify** that the CCW FLOW FROM RCP OIL CLRS LO annunciator DD3 is clear. ☐
8. **Verify** that the RCP 1A BRG UPPER/LOWER OIL RES HI LVL annunciator HG1 is clear. ☐
9. **Verify** that the RCP 1A BRG UPPER/LOWER OIL RES LO LVL annunciator HH1 is clear. ☐
10. WHEN one or more of the RCS cold leg temperatures is less than 275°F, THEN **record** PRZR level and steam generator ΔT as per FNP-1-UOP-1.1, Startup Of Unit From Cold Shutdown To Hot Standby. ☐

4.1 1A RCP STARTUP. (continued)

NOTES

- The oil lift pump must be operated for at least 2 minutes prior to starting the RCP. ☐
- An oil lift pump may need to operate for several minutes (more than 5) before enough pressure is developed to actuate the pressure switch that will illuminate the white light. The length of run time may vary due to oil temperature, secured time and pressure switch sensitivities. **(AI12011201221)** ☐

11. IF evidence of a "cocked" #1 RCP seal exists, THEN with OPS Shift Manager approval, **Proceed** To Attachment 1, Starting the 1A RCP to Correct a Cocked #1 Seal Condition

12. **Start** the 1A RCP Oil Lift Pump. Adequate oil pressure is indicated by the white light coming ON. ☐

13. **Verify** that the 1A RCP SEAL LEAKOFF valve Q1E21HV8141A is OPEN. ☐

14. **Verify** that 1A RCP No. 1 Seal Leakoff Flow rate is within the limits of Figure 1. ☐

15. **Verify** that the SEAL WTR INJ FLTR HI ΔP annunciator DC4 is clear. ☐

16. **Verify** that the RCP SEAL INJ FLOW LO annunciator DD1 is clear. ☐

17. **Verify** that all RCP No. 1 Seal ΔP's are greater than 210 psid. ☐

18. **Verify** that the RCP #1 SEAL LO ΔP annunciator DC3 is clear. ☐

19. **Verify** that the Oil Lift Pump for RCP 1A has run for at least 2 minutes, and is producing adequate pressure (white light ON). ☐

20. **Start** 1A RCP. Verify that all loop 1A flow instruments show an increasing flow rate. ☐

21. **Verify** that RCP 1A amperage decreases to a normal operating range of 900 amps cold and 700 amps hot. ☐

22. **Verify** that the 1A RCS LOOP FLOW LO annunciator EF1 is clear. ☐

CAUTIONS

- The RCP seal water bypass valve Q1E21HV8142, should only be opened IF No. 1 seal leakoff flow rate is < 1 gpm AND RCS pressure is < 1000 psig. During RCS heatup/pressurization or cooldown/depressurization, the seal water bypass valve, Q1E21HV8142, may be left closed unless pump bearing temperature or No. 1 seal outlet temperature approach their alarm levels. ☐
- During normal operation, the seal water bypass valve should remain closed. ☐

23. After at least 1 minute of 1A RCP operation, **stop** the Oil Lift Pump. ☐

4.1 1A RCP STARTUP. (continued)

NOTE

1 Seal Injection flow should be maintained at ~ 8 gpm to each RCP. ☐

24. **Observe** RCP operating parameters very closely during the initial several minutes after starting. Special attention should be given to indications relating to pump seal performance. ☐

NOTE

If additional RCP's are to be started, performance of the following step may be delayed until all RCP's are running. This is due to ALARA concerns for entering containment. ☐

25. **Open** BKR 11, 1A RCP termination box strip heater, in 120 V 1G receptacle panel N1T51L002B (129 ft CTMT) to de-energize the strip heater. ☐

NOTES

- Initial startup of a RCP will be performed in accordance with FNP-1-UOP-1.1, Startup Of Unit From Cold Shutdown To Hot Standby, OR FNP-1-SOP-1.3, Reactor Coolant System Filling And Venting. FNP-1-UOP-1.1, Startup Of Unit From Cold Shutdown To Hot Standby, covers the initial startup of a RCP with the reactor coolant system in solid water operation and ensures all pumps are running prior to entry into mode 4. Starting of additional pumps may be performed by this procedure following the start of the first RCP. ☐
- Initial startup of a RCP may also be performed during Plant Shutdown per this procedure (FNP-1-SOP-1.1) when sent here from FNP-1-UOP-2.2, Shutdown Of Unit From Hot Standby To Cold Shutdown, Attachment 5. FNP-1-UOP-2.2, Attachment 5 references this procedure (FNP-1-SOP-1.1) to start a RCP during shutdown, either solid plant or with a bubble in the pressurizer. ☐

CAUTION

Prior to starting a RCP, consideration should be given to raising the 230 kV bus voltage such that the emergency 4160 volt buses are approaching the 4200 volt limit to preclude spurious RCP breaker trip. **(AI2010200391)** ☐

4.2 1B RCP STARTUP.

1. **Verify** RCP seal flow established per FNP-1-SOP-2.1, Chemical And Volume Control System Plant Startup And Operation. ☐
2. **Verify** VCT pressure > 18 psig. ☐
3. IF RHR is aligned to the RCS, THEN **verify** RCS pressure is 325-375 psig. ☐
4. IF RHR is NOT aligned to the RCS, THEN **verify** RCS pressure ≥ 350 psig. ☐
5. **Verify** that the 1B RCP STANDPIPE LVL LO annunciator DA2 is clear. ☐
6. **Verify** that the RCP THRM BARR CCW FLOW HI annunciator DD2 is clear. ☐

4.2 1B RCP STARTUP. (continued)

7. **Verify** that the CCW FLOW FROM RCP OIL CLRS LO annunciator DD3 is clear. ☐

8. **Verify** that the RCP 1B BRG UPPER/LOWER OIL RES HI LVL annunciator HG2 is clear. ☐

9. **Verify** that the RCP 1B BRG UPPER/LOWER OIL RES LO LVL annunciator HH2 is clear. ☐

10. WHEN one or more of the RCS cold leg temperatures is less than 275°F, THEN **record** Przr level and steam generator ΔT as per FNP-1-UOP-1.1, Startup Of Unit From Cold Shutdown To Hot Standby. ☐

NOTES

- The oil lift pump must be operated for at least 2 minutes prior to starting the RCP. ☐
- An oil lift pump may need to operate for several minutes (more than 5) before enough pressure is developed to actuate the pressure switch that will illuminate the white light. The length of run time may vary due to oil temperature, secured time and pressure switch sensitivities. **(AI12011201221)** ☐

11. **Start** the 1B RCP Oil Lift Pump. Adequate oil pressure is indicated by the white light coming ON. ☐

12. **Verify** that the 1B RCP SEAL LEAKOFF valve Q1E21HV8141B is OPEN. ☐

13. **Verify** that 1B RCP No. 1 Seal Leakoff Flow rate is within the limits of Figure 1. ☐

14. **Verify** that the SEAL WTR INJ FLTR HI ΔP annunciator DC4 is clear. ☐

15. **Verify** that the RCP SEAL INJ FLOW LO annunciator DD1 is clear. ☐

16. **Verify** that all RCP No. 1 Seal ΔP's are greater than 210 psid. ☐

17. **Verify** that the RCP #1 SEAL LO ΔP annunciator DC3 is clear. ☐

18. **Verify** that the Oil Lift Pump for RCP 1B has run for at least 2 minutes, and is producing adequate pressure (white light ON). ☐

19. **Start** 1B RCP. Verify that all loop 1B flow instruments show an increasing flow rate. ☐

20. **Verify** that RCP 1B amperage decreases to a normal operating range of 900 amps cold and 700 amps hot. ☐

21. **Verify** that the 1B RCS LOOP FLOW LO annunciator EF2 is clear. ☐

4.2 1B RCP STARTUP. (continued)

CAUTIONS

- The RCP seal water bypass valve Q1E21HV8142, should only be opened IF No. 1 seal leakoff flow rate is < 1 gpm AND RCS pressure is < 1000 psig. During RCS heatup/pressurization or cooldown/depressurization, the seal water bypass valve, Q1E21HV8142, may be left closed unless pump bearing temperature or No. 1 seal outlet temperature approach their alarm levels. ☐
- During normal operation, the seal water bypass valve should remain closed. ☐

22. After at least 1 minute of 1B RCP operation, **stop** the Oil Lift Pump. ☐

NOTE

1 Seal Injection flow should be maintained at ~ 8 gpm to each RCP. ☐

23. **Observe** RCP operating parameters very closely during the initial several minutes after starting. Special attention should be given to indications relating to pump seal performance. ☐

NOTE

If additional RCP's are to be started, performance of the following step may be delayed until all RCP's are running. This is due to ALARA concerns for entering containment. ☐

24. **Open** BKR 9, 1B RCP termination box strip heater, in 120 V 1G receptacle panel N1T51L002B (129 ft CTMT) to de-energize the strip heater. ☐

NOTES

- Initial startup of a RCP will be performed in accordance with FNP-1-UOP-1.1, Startup Of Unit From Cold Shutdown To Hot Standby, OR FNP-1-SOP-1.3, Reactor Coolant System Filling And Venting. FNP-1-UOP-1.1, Startup Of Unit From Cold Shutdown To Hot Standby, covers the initial startup of a RCP with the reactor coolant system in solid water operation and ensures all pumps are running prior to entry into mode 4. Starting of additional pumps may be performed by this procedure following the start of the first RCP. ☐
- Initial startup of a RCP may also be performed during Plant Shutdown per this procedure (FNP-1-SOP-1.1) when sent here from FNP-1-UOP-2.2, Shutdown Of Unit From Hot Standby To Cold Shutdown, Attachment 5. FNP-1-UOP-2.2, Attachment 5 references this procedure (FNP-1-SOP-1.1) to start a RCP during shutdown, either solid plant or with a bubble in the pressurizer. ☐

CAUTION

Prior to starting a RCP, consideration should be given to raising the 230 kV bus voltage such that the emergency 4160 volt buses are approaching the 4200 volt limit to preclude spurious RCP breaker trip. **(AI2010200391)** ☐

4.3 1C RCP STARTUP.

1. **Verify** RCP seal flow established per FNP-1-SOP-2.1, Chemical And Volume Control System Plant Startup And Operation. ☐
2. **Verify** VCT pressure > 18 psig. ☐
3. IF RHR is aligned to the RCS, THEN **verify** RCS pressure is 325-375 psig. ☐
4. IF RHR is NOT aligned to the RCS, THEN **verify** RCS pressure ≥ 350 psig. ☐
5. **Verify** that the 1C RCP STANDPIPE LVL LO annunciator DA3 is clear. ☐
6. **Verify** that the RCP THRM BARR CCW FLOW HI annunciator DD2 is clear. ☐
7. **Verify** that the CCW FLOW FROM RCP OIL CLRS LO annunciator DD3 is clear. ☐
8. **Verify** that the RCP 1C BRG UPPER/LOWER OIL RES HI LVL annunciator HG3 is clear. ☐
9. **Verify** that the RCP 1C BRG UPPER/LOWER OIL RES LO LVL annunciator HH3 is clear. ☐
10. WHEN one or more of the RCS cold leg temperatures is less than 275°F, THEN **record** Przr level and steam generator ΔT as per FNP-1-UOP-1.1, Startup Of Unit From Cold Shutdown To Hot Standby. ☐

4.3 1C RCP STARTUP. (continued)

NOTES

- The oil lift pump must be operated for at least 2 minutes prior to starting the RCP. ☐
- An oil lift pump may need to operate for several minutes (more than 5) before enough pressure is developed to actuate the pressure switch that will illuminate the white light. The length of run time may vary due to oil temperature, secured time and pressure switch sensitivities. (AI12011201221) ☐

11. **Start** the 1C RCP Oil Lift Pump. Adequate oil pressure is indicated by the white light coming ON. ☐
12. **Verify** that the 1C RCP SEAL LEAKOFF valve Q1E21HV8141C is OPEN. ☐
13. **Verify** that 1C RCP No. 1 Seal Leakoff Flow rate is within the limits of Figure 1. ☐
14. **Verify** that the SEAL WTR INJ FLTR HI ΔP annunciator DC4 is clear. ☐
15. **Verify** that the RCP SEAL INJ FLOW LO annunciator DD1 is clear. ☐
16. **Verify** that all RCP No. 1 Seal ΔP's are greater than 210 psid. ☐
17. **Verify** that the RCP #1 SEAL LO ΔP annunciator DC3 is clear. ☐
18. **Verify** that the Oil Lift Pump for RCP 1C has run for at least two minutes, and is producing adequate pressure (white light ON). ☐
19. **Start** 1C RCP. Verify that all loop 1C flow instruments show an increasing flow rate. ☐
20. **Verify** that RCP 1C amperage decreases to a normal operating range of 900 amps cold and 700 amps hot. ☐
21. **Verify** that the 1C RCS LOOP FLOW LO annunciator EF3 is clear. ☐

CAUTIONS

- The RCP seal water bypass valve Q1E21HV8142, should only be opened IF No. 1 seal leakoff flow rate is < 1 gpm AND RCS pressure is < 1000 psig. During RCS heatup/pressurization or cooldown/depressurization, the seal water bypass valve, Q1E21HV8142, may be left closed unless pump bearing temperature or No. 1 seal outlet temperature approach their alarm levels. ☐
- During normal operation, the seal water bypass valve should remain closed. ☐

22. After at least 1 minute of 1C RCP operation, **stop** the Oil Lift Pump. ☐

4.3 1C RCP STARTUP. (continued)

NOTE

1 Seal Injection flow should be maintained at ~ 8 gpm to each RCP. ☐

23. **Observe** RCP operating parameters very closely during the initial several minutes after starting. Special attention should be given to indications relating to pump seal performance. ☐

NOTE

If additional RCP's are to be started, performance of the following step may be delayed until all RCP's are running. This is due to ALARA concerns for entering containment. ☐

24. **Open** BKR 7, 1B RCP termination box strip heater, in 120 V 1G receptacle panel N1T51L002B (129 ft CTMT) to de-energize the strip heater. ☐

4.4 1A RCP SHUTDOWN

NOTE

RCP shutdown should be performed in conjunction with the applicable UOP. ☐

1. IF plant is in Mode 3, THEN **verify** that the reactor trip breakers are open OR the rod drive MG sets are shutdown to prevent rod withdrawal prior to having more than one RCP secured (Refer To Technical Specification 3.4.5). ☐

2. **Verify** the desired boron concentration in the RCS and PRZR has been achieved prior to securing the only running RCP. (**SOER 94-02)** ☐

3. **Place** 1A RCP control switch to TRIP position. ☐

4. **Verify** the 1A RCP motor current decreases to approximately 0 amps. ☐

NOTE

If additional RCP's are to be stopped, performance of the following step may be delayed until all RCP's are stopped. This is due to ALARA concerns for entering containment. ☐

5. IF 1A RCP is to remain stopped for greater than 1 month, THEN **close** BKR 11, 1A RCP termination box strip heater, in 120 V 1G receptacle panel N1T51L002B (129 ft CTMT) to energize the strip heater. ☐

4.5 1B RCP SHUTDOWN.

NOTE

RCP shutdown should be performed in conjunction with the applicable UOP. ☐

1. IF plant is in Mode 3, THEN **verify** that the reactor trip breakers are open OR the rod drive MG sets are shutdown to prevent rod withdrawal prior to having more than one RCP secured (Refer To Technical Specification 3.4.5). ☐

4.5 1B RCP SHUTDOWN. (continued)

2. **Verify** the desired boron concentration in the RCS and PRZR has been achieved prior to securing the only running RCP. (SOER 94-02) ☐

3. **Place** 1B RCP control switch to TRIP position. ☐

4. **Verify** the 1B RCP motor current decreases to approximately 0 amps. ☐

NOTE

If additional RCP's are to be stopped, performance of the following step may be delayed until all RCP's are stopped. This is due to ALARA concerns for entering containment.` ☐

5. IF 1B RCP is to remain stopped for greater than 1 month, THEN **close** BKR 9, 1B RCP termination box strip heater, in 120 V 1G receptacle panel N1T51L002B (129 ft CTMT) to energize the strip heater ☐

4.6 1C RCP SHUTDOWN.

NOTE

RCP shutdown should be performed in conjunction with the applicable UOP. ☐

1. IF plant is in Mode 3, THEN **verify** that the reactor trip breakers are open OR the rod drive MG sets are shutdown to prevent rod withdrawal prior to having more than one RCP secured (Refer To Technical Specification 3.4.5). ☐

2. **Verify** the desired boron concentration in the RCS and PRZR has been achieved prior to securing the only running RCP. (**SOER 94-02)** ☐

3. **Place** 1C RCP control switch to TRIP position. ☐

4. **Verify** the 1C RCP motor current decreases to approximately 0 amps. ☐

NOTE

If additional RCP's are to be stopped, performance of the following step may be delayed until all RCP's are stopped. This is due to ALARA concerns for entering containment ☐

5. IF 1C RCP is to remain stopped for greater than 1 month, THEN **close** BKR 7, 1C RCP termination box strip heater, in 120 V 1G receptacle panel N1T51L002B (129 ft CTMT) to energize the strip heater ☐

4.7 PRZR HEATER OPERATION.

NOTE

PRZR heaters should be operated in conjunction with unit operating procedures. ☐

CAUTION

Maintain RCS pressure in accordance with temperature/pressure limits of Technical Specification. ☐

1. Manual PRZR heater operation.

   a. **Energize** 1A (B, D, E) PRZR HTR GROUP BACKUP by **placing** the control switch to the ON position. ☐

   b. **De-energize** 1A (B, D, E) PRZR HTR GROUP BACKUP by **placing** the control switch to the OFF position. ☐

   c. WHEN the need for manual control has passed, THEN **place** 1A (B, D, E) PRZR HTR GROUP BACKUP control switch to the AUTO position. ☐

NOTE

The following step will cause annunciator HD4 PZR HTR CONT TRBL. ☐

   d. **De-energize** 1C PRZR HTR GROUP VARIABLE by **placing** control switch to OFF (spring Return To neutral). ☐

2. Normal automatic PRZR heater operation.

   a. **Verify** 1A, 1B, 1D and 1E PRZR HTR GROUP BACKUP control switches to the AUTO position. ☐

   b. **Place** 1A PRZR HTR GRP BLOCKING BYPASS SWITCH to BLOCK. ☐

   c. **Place** 1C PRZR HTR GROUP VARIABLE control switch to the ON position (Spring returns to neutral). ☐

   d. **Monitor** PRZR variable heater operation, **verify** PRZR pressure maintained at approximately 2235 psig. ☐

4.7 PRZR HEATER OPERATION. (continued)

3. Pressurizer Heater GRP 1A operation during LOSP or SI/LOSP.

NOTE

DCP 88-1-4773 modified the PRZR HTR GROUP 1A supply breaker EA-11 control circuit to block automatic heater energizing when offsite power is unavailable. The intent of the BLOCK/BYPASS switch is to regain automatic heater energizing of the 1A heaters after appropriate diesel generator load management actions have been completed. (Ref. D-177109) ☐

a. WHEN required to energize PRZR HTR GROUP 1A during an LOSP, THEN **place** PRZR HTR GRP 1A BLOCKING BYPASS SW to BYPASS. ☐

b. WHEN offsite power has been restored, THEN **return** the PRZR HTR GRP 1A BLOCKING BYPASS SW to BLOCK. ☐

5.0 RECORDS

Documents created using this procedure will become QA Records when completed unless otherwise stated. The procedures and documents are considered complete when issued in DMS.

QA Record (X)	Non-QA Record (X)	Record Generated	Retention Time	R-Type
X		FNP-1-SOP-1.1	LP	HH6.051

6.0 REFERENCES

1. PROCEDURES

   a. FNP-1-ARP-1.4, Main Control Board Annunciator Panel "D"

   b. FNP-1-SOP-1.1A, Reactor Coolant System

   c. FNP-1-SOP-1.1B, Reactor Coolant System

   d. FNP-1-SOP-1.2, Reactor Coolant Pressure Relief System

   e. FNP-1-SOP-1.3, Reactor Coolant System Filling And Venting

   f. FNP-1-SOP-1.11, Reactor Coolant System Filling And Venting - Dynamic Method

   g. FNP-1-SOP-2.1, Chemical and Volume Control System Plant Startup and Operation

6.0 REFERENCES (continued)

1. (continued)

   h. FNP-1-SOP-23.0, Component Cooling Water System

   i. FNP-1-SOP-24.0, Service Water System

   j. FNP-1-SOP-31.0, Compressed Air System

   k. FNP-1-SOP-36.0, Plant Electrical Distribution Line-Up

   l. FNP-1-SOP-50.0, Liquid Waste Processing System

   m. FNP-1-UOP-1.1, Startup Of Unit From Cold Shutdown To Hot Standby, Attachment 5

   n. FNP-1-UOP-2.2, Shutdown Of Unit From Hot Standby To Cold Shutdown, Attachment 5

   o. RCP Technical Manual Technical Bulletin 81-02

   p. Technical Specification 3.4.5

2. DRAWINGS

   a. D-175037, sh. 1, 2, 3 Reactor Coolant System

   b. D-175039, sh. 1, 2 Chemical and Volume Control System

   c. D-175002, sh. 2, Component Cooling Water

   d. D-175003, sh. 2, Service Water

   e. D-176152, 176157, Containment Penetration Schedule

   f. Technical Manual: U-258242, Controlled Leakage Seal Reactor Coolant Pump

   g. FSAR - Vol. VI – Section 5.5

   h. PCN B88-1-5259

   i. PCN B88-1-4773

7.0 <u>COMMITMENTS, OPEN ITEMS, AND ACTION ITEMS</u>

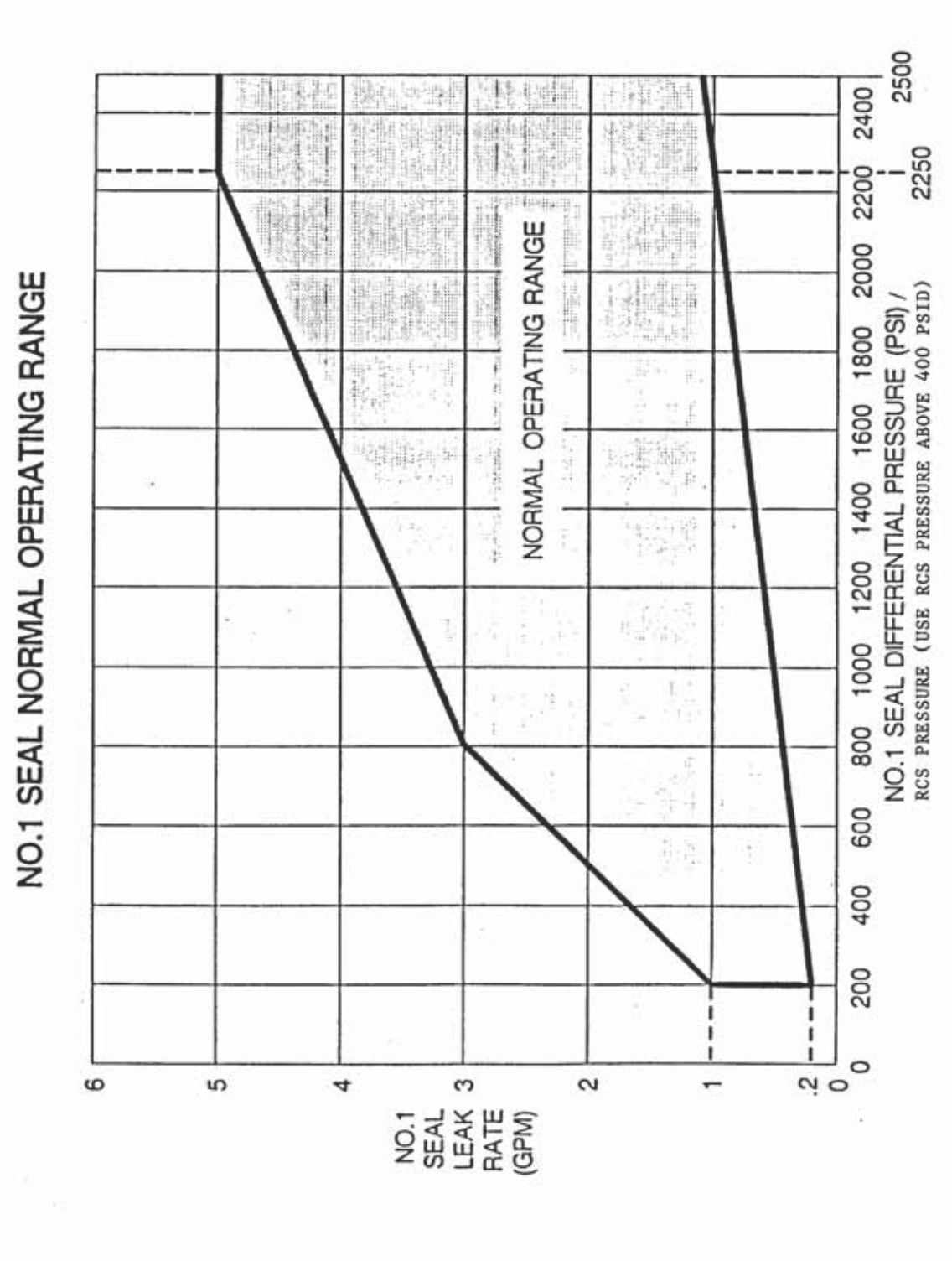
   a. SOER 94-02

   b. AI2010200391

END OF PROCEDURE TEXT

FIGURE 1
Page 1 of 1

No. 1 Seal Normal Operating Range



OPERATION OF AN UNCOUPLED RCP MOTOR

1.0 PURPOSE

This attachment provides Initial Conditions, Precautions, and Instructions for the operation of an uncoupled RCP motor

2.0 INITIAL CONDITIONS

1. The electrical distribution system is energized and aligned for normal operation per FNP-1-SOP-36.0, Plant Electrical Distribution Line-Up, with exceptions noted. ☐

2. The compressed air system is aligned and in service per FNP-1-SOP-31.0, Compressed Air System, with exceptions noted. ☐

3. The Service Water System (SW) is aligned and in service per FNP-1-SOP-24.0, Service Water System, with exceptions noted. ☐

4. Component Cooling Water (CCW) is supplying Reactor Coolant Pump oil coolers per FNP-1-SOP-23.0, Component Cooling Water System, with exceptions noted. ☐

3.0 PRECAUTIONS AND LIMITATIONS

1. DO NOT attempt to start a RCP unless its oil lift pump has been delivering oil to the upper thrust shoes for at least 2 minutes. Observe the oil lift pumps indicating lights to verify correct oil pump motor operation and oil pressure. The oil lift pumps should run at least 1 minute after the RCPs are started. An interlock will prevent starting a RCP until 600 psig oil pressure is established. ☐

2. Maintain RCP CCW supply temperature < 105°F. ☐

3. IF CCW flow to the RCP motor bearing oil coolers is lost, THEN pump operation may be continued until the motor upper or lower bearing temperature reaches 195°F (approximately 2 minutes after cooling water flow stops). ☐

OPERATION OF AN UNCOUPLED RCP MOTOR

3.0 PRECAUTIONS AND LIMITATIONS (continued)

4. The RCPs are not designed for "start-stop" operations. Too frequent starting may damage the motor windings. To prevent such damage, the following maximum starting duty should be observed:

   a. Only one RCP is to be started at any one time.

   b. After any running period OR after any attempted start that fails, allow a minimum 30 minute idle period before attempting a restart.

   c. DO NOT exceed three starts or attempted starts in a 2 hour period. IF three starts OR attempted starts have been made within a two hour period, THEN allow a 60 minute idle period before attempting an additional start.

5. IF CCW will be secured to the RCP motor oil coolers for longer than 2 months, THEN contact Maintenance to have the oil coolers drained and dried per RCP Technical Manual Technical Bulletin 81-02.

6. IF an RCP is to be secured for greater than one month, THEN its termination box strip heaters should be energized.

4.0 INSTRUCTIONS

4.1 1A RCP Motor Startup (uncoupled)

NOTE

Annunciator DD3 may be in alarm due to CCW being isolated to another RCP. ☐

1. **Check** that the CCW FLOW FROM RCP OIL CLRS LO annunciator DD3 is clear. ☐

2. IF annunciator DD3 is NOT clear, THEN locally **verify** adequate CCW flow to the RCP motor to be run. ☐

3. **Check** that the RCP 1A BRG UPPER/LOWER OIL RES HI LVL annunciator HG1 is clear. ☐

4. **Check** that the RCP 1A BRG UPPER/LOWER OIL RES LO LVL annunciator HH1 is clear. ☐

5. Locally **verify** that RCP 1A motor upper and lower oil reservoir level is in the normal operating band. ☐

OPERATION OF AN UNCOUPLED RCP MOTOR

4.1 1A RCP Motor Startup (uncoupled) (continued)

NOTE
The oil lift pump must be operated for at least 2 minutes prior to starting the RCP. ☐

6. **Start** the 1A RCP Oil Lift Pump. Adequate oil pressure is indicated by the white light coming ON. ☐

7. **Verify** that the Oil Lift Pump for RCP 1A has run for at least 2 minutes, and is producing adequate pressure (white light ON). ☐

8. **Start** 1A RCP motor. ☐

9. **Verify** that RCP 1A amperage decreases to approximately 200 amps. ☐

10. After at least one minute of 1A RCP motor operation, **stop** its Oil Lift Pump. ☐

11. **Observe** RCP operating parameters very closely during the initial several minutes after starting and periodically throughout the run. The Plant Computer should be used for trending motor bearing temperatures. ☐

NOTE
Electrical Maintenance should be contacted for guidance on operation of termination box strip heaters based on length of desired uncoupled run, tagging in place, outage length, etc. Reference Attachment 1 Section 3.0 Step 6. ☐

12. IF desired THEN **verify** 1A RCP termination box strip heaters de-energized by **opening** the appropriate breaker 11 in 120 V 1G receptacle panel N1T51L002B (129 ft CTMT). ☐

4.2 1B RCP Motor Startup (uncoupled)

NOTE
Annunciator DD3 may be in alarm due to CCW being isolated to another RCP. ☐

1. **Check** that the CCW FLOW FROM RCP OIL CLRS LO annunciator DD3 is clear. ☐

2. IF annunciator DD3 is NOT clear, THEN locally **verify** adequate CCW flow to the RCP motor to be run. ☐

3. **Check** that the RCP 1BC BRG UPPER/LOWER OIL RES HI LVL annunciator HG2 is clear. ☐

4. **Check** that the RCP 1B BRG UPPER/LOWER OIL RES LO LVL annunciator HH2 is clear. ☐

OPERATION OF AN UNCOUPLED RCP MOTOR

4.2 1B RCP Motor Startup (uncoupled) (continued)

5. Locally **verify** that RCP 1B motor upper and lower oil reservoir level is in the normal operating band. ☐

NOTE
The oil lift pump must be operated for at least 2 minutes prior to starting the RCP. ☐

6. **Start** the 1B RCP Oil Lift Pump. Adequate oil pressure is indicated by the white light coming ON. ☐

7. **Verify** that the Oil Lift Pump for RCP 1B has run for at least 2 minutes, and is producing adequate pressure (white light ON). ☐

8. **Start** 1B RCP motor. ☐

9. **Verify** that RCP 1B amperage decreases to approximately 200 amps. ☐

10. After at least one minute of 1B RCP motor operation, **stop** its Oil Lift Pump. ☐

11. **Observe** RCP operating parameters very closely during the initial several minutes after starting and periodically throughout the run. The Plant Computer should be used for trending motor bearing temperatures. ☐

NOTE
Electrical Maintenance should be contacted for guidance on operation of termination box strip heaters based on length of desired uncoupled run, tagging in place, outage length, etc. Reference Attachment 1 Section 3.0 Step 6. ☐

12. IF desired THEN **verify** 1B RCP termination box strip heaters de-energized by **opening** breaker 9 in 120 V 1G receptacle panel N1T51L002B (129 ft CTMT). ☐

4.3 1C RCP Motor Startup (uncoupled)

NOTE
Annunciator DD3 may be in alarm due to CCW being isolated to another RCP. ☐

1. **Check** that the CCW FLOW FROM RCP OIL CLRS LO annunciator DD3 is clear. ☐

2. IF annunciator DD3 is NOT clear, THEN locally **verify** adequate CCW flow to the RCP motor to be run. ☐

3. **Check** that the RCP 1C BRG UPPER/LOWER OIL RES HI LVL annunciator HG3 is clear. ☐

OPERATION OF AN UNCOUPLED RCP MOTOR

4.3 1C RCP Motor Startup (uncoupled) (continued)

4. **Check** that the RCP 1C BRG UPPER/LOWER OIL RES LO LVL annunciator HH3 is clear. ☐

5. Locally **verify** that RCP 1C motor upper and lower oil reservoir level is in the normal operating band. ☐

NOTE

The oil lift pump must be operated for at least 2 minutes prior to starting the RCP. ☐

6. **Start** the 1C RCP Oil Lift Pump. Adequate oil pressure is indicated by the white light coming ON. ☐

7. **Verify** that the Oil Lift Pump for RCP 1C has run for at least 2 minutes, and is producing adequate pressure (white light ON). ☐

8. **Start** 1C RCP motor. ☐

9. **Verify** that RCP 1C amperage decreases to approximately 200 amps. ☐

10. After at least one minute of 1C RCP motor operation, **stop** its Oil Lift Pump. ☐

11. **Observe** RCP operating parameters very closely during the initial several minutes after starting and periodically throughout the run. The Plant Computer should be used for trending motor bearing temperatures. ☐

NOTE

Electrical Maintenance should be contacted for guidance on operation of termination box strip heaters based on length of desired uncoupled run, tagging in place, outage length, etc. Reference Attachment 1 Section 3.0 Step 6. ☐

12. IF desired THEN **verify** 1C RCP termination box strip heaters de-energized by **opening** breaker 7 in 120 V 1G receptacle panel N1T51L002B (129 ft CTMT). ☐

OPERATION OF AN UNCOUPLED RCP MOTOR

4.4 1A RCP Motor Shutdown (uncoupled)

1. **Stop** 1A RCP motor by **placing** control switch to TRIP position. ☐
2. **Verify** the 1A RCP motor current decreases to approximately zero amps. ☐

NOTE
Electrical Maintenance should be contacted for guidance on operation of termination box strip heaters based on length of desired uncoupled run, tagging in place, outage length, etc. Reference Attachment 1 Section 3.0 Step 6. ☐

3. IF desired, THEN **verify** 1A RCP termination box strip heaters energized for any RCP that is to remain stopped for greater than 1 month by **closing** breaker 11 in 120 V 1G receptacle panel N1T51L002B (129 ft CTMT). ☐

4.5 1B RCP Motor Shutdown (uncoupled)

a. **Stop** 1B RCP motor by **placing** control switch to TRIP position. ☐

2. **Verify** the 1B RCP motor current decreases to approximately zero amps. ☐

NOTE
Electrical Maintenance should be contacted for guidance on operation of termination box strip heaters based on length of desired uncoupled run, tagging in place, outage length, etc. Reference Attachment 1 Section 3.0 Step 6. ☐

3. IF desired, THEN **verify** 1B RCP termination box strip heaters energized for any RCP that is to remain stopped for greater than 1 month by **closing** breaker 9 in 120 V 1G receptacle panel N1T51L002B (129 ft CTMT). ☐

4.6 1C RCP Motor Shutdown (uncoupled)

1. **Stop** 1C RCP motor by **placing** control switch to TRIP position. ☐
2. **Verify** the 1C RCP motor current decreases to approximately zero amps. ☐

NOTE
Electrical Maintenance should be contacted for guidance on operation of termination box strip heaters based on length of desired uncoupled run, tagging in place, outage length, etc. Reference Attachment 1 Section 3.0 Step 6. ☐

3. IF desired, THEN **verify** 1C RCP termination box strip heaters energized for any RCP that is to remain stopped for greater than 1 month by **closing** breaker 7 in 120 V 1G receptacle panel N1T51L002B (129 ft CTMT). ☐

ROTATING A RCP BY HAND

1.0 PURPOSE

This attachment provides Initial Conditions, Precautions, and Instructions for manually rotating a RCP.

2.0 INITIAL CONDITIONS

1. The RCP to be rotated by hand is tagged out. Indicate which RCP below.
   - 1A RCP ☐
   - 1B RCP ☐
   - 1C RCP ☐
2. RCP seal flow established per FNP-1-SOP-2.1, Chemical And Volume Control System Plant Startup And Operation.

3.0 PRECAUTIONS AND LIMITATIONS

1. DO NOT use any type of mechanical advantage on the RCP to perform the rotation by hand.
2. The Anti-Reverse-Rotation Device will prevent rotation in the clockwise direction (when looking down on the RCP from above).

ROTATING A RCP BY HAND

4.0 INSTRUCTIONS

1. **Start** the RCP Oil Lift Pump for the RCP to be rotated by hand. Adequate oil pressure is indicated by the white light coming ON. ☐
2. Locally **check** the RCP upper and lower oil reservoir levels adequate. ☐

NOTES

- Body placement must be carefully considered to avoid unnecessary back strain while rotating the RCP manually. It may be practical to use a push/pull method with both hands applied to coupling bolts on either side of the RCP shaft. ☐
- The RCP can only be rotated counterclockwise, when viewed from the motor. ☐

3. **Grasp** the coupling bolts and rotate the RCP shaft. ☐
4. **Rotate** the RCP through several rotations. ☐
5. **Report** to the control room any deficiencies noted. ☐
   a. Have completion **recorded** in the Control Room Log. ☐
6. **Secure** the RCP Oil Lift Pump for the RCP rotated by hand. ☐

PRESSURIZER HEATER OPERATION TO SUPPORT FNP-1-STP-938, PRESSURIZER HEATER CAPACITY CHECK

1.0 PURPOSE

This attachment provides a methodology to support EM in the performance of obtaining necessary data to verify the PZR heater groups can maintain the required heating capacity. Sequence of operation of heater groups allows EM to obtain all data on Rad-side before going to Non-rad side of Auxiliary Building.

2.0 INITIAL CONDITIONS

1. Pressurizer pressure control is in automatic. (Spray valves and heaters). ☐
2. Cycling (Proportional) Heaters are the only heater group energized. ☐
3. The plant is stable. ☐
4. The IPC is available and operable. ☐

3.0 PRECAUTIONS AND LIMITATIONS

1. All Precautions and Limitations of Main Body of SOP apply. ☐

PRESSURIZER HEATER OPERATION TO SUPPORT FNP-1-STP-938, PRESSURIZER HEATER CAPACITY CHECK

4.0 INSTRUCTIONS

NOTE

Reference is listed in Table 1 for PK-444A Controller Demand Functions. ☐

Table 1

PK-444A	
Controller Demand	Function
70.0%	Backup Heaters ON
67.5%	Backup Heaters OFF
65.0%	Proportional heaters Full ON
57.5%	Reference Pressure (2235 psig)
50.0%	Proportional heaters Full OFF
45.0%	Spray Valves Full Closed
20.0%	Spray Valves Full Open
17.5%	PORV 444B Closed
7.5%	PORV 444B Open

1. **Establish** a trend on the IPC of PZR pressure (suggest PC0482). _____

2. **Establish** a band for pressure control. _____ psig to _____ psig.

3. **Record** the demand indicated on the following:

   - PK-444A _____
   - PK-444C_____
   - PK-444D_____

4. **Record** the steady state RCS pressure _____ psig.

5. **Place** PK-444A in MANUAL. _____

6. **Raise** demand on PK-444A to a value between 65-67.0%. _____

NOTE

Only one spray valve will be utilized to control PZR pressure. ☐

7. **Place** one of the Spray valves in MANUAL. **Indicate** which valve used. _____

   - PK-444C, 1A LOOP SPRAY VALVE ☐
   - PK-444D, 1B LOOP SPRAY VALVE ☐

PRESSURIZER HEATER OPERATION TO SUPPORT FNP-1-STP-938, PRESSURIZER HEATER CAPACITY CHECK

4.0 INSTRUCTIONS (continued)

8. **Raise** the demand on the spray valve in MANUAL as necessary to compensate for the increased output on the cycling (proportional) heater group, maintaining RCS pressure stable. _____

9. **Maintain** stable conditions until EM report that they have obtained their data. _____

10. IF the REP. Task is for A PZR Htr. group, THEN **perform** the following:

    a. N/A Step 11 through Step 28. _____

    b. **Go To** Step 29. _____

11. IF the REP. Task is for B PZR Htr. group, THEN **perform** the following:

    a. N/A Step 12 through Step 40. _____

    Go To Step 41. _____

12. **Place** the 1D Back-Up heater group in ON. _____

NOTE

The following step will keep some voltage applied to the Cycling (Proportional) Heaters. ☐

13. **Lower** demand on PK-444A until demand is approximately 2-3% less than the value recorded in Step 3. _____

14. **Adjust** the demand on the spray valve in MANUAL as necessary to maintain a steady trend of RCS pressure. _____

15. **Maintain** stable conditions until EM report that they have obtained their data. _____

16. **Place** the 1E Back-Up heater group in ON. _____

17. WHEN RCS Pressure starts to trend up, THEN **secure** the 1D B/U HTR Group. _____

18. **Adjust** the demand on the spray valve in MANUAL as necessary to maintain a steady trend of RCS Pressure. _____

19. **Maintain** stable conditions until EM reports they have obtained their data. _____

20. **Begin raising** demand on PK-444A to the demand value recorded in Step 3. _____

PRESSURIZER HEATER OPERATION TO SUPPORT FNP-1-STP-938, PRESSURIZER HEATER CAPACITY CHECK

4.0 INSTRUCTIONS (continued)

21. WHEN RCS Pressure starts to rise, THEN **secure** the 1E B/U HTR Group. _____
22. **Adjust** the demand on the spray valve in MANUAL as necessary to maintain a steady trend of RCS pressure. _____
23. WHEN RCS pressure returns to the stable value recorded in Step 4, THEN **check** the spray valve in MANUAL has returned to a demand approximately the same as what was recorded in Step 3. _____
24. WHEN RCS Pressure returns to the stable value recorded in Step 4, THEN **check** PK-444A has returned to a demand approximately the same value as what was recorded in Step 3. _____
25. **Return** the spray valve in MANUAL to AUTO. _____
26. **Place** PK-444A in AUTO. _____
27. **Check** that pressurizer pressure control is operating satisfactorily. _____
28. N/A Step 29 through Step 54. _____
29. **Place** the 1A Back-Up heater group in ON. _____
30. **Lower** demand on PK-444A until demand is approximately 2-3% less than the value recorded in Step 3. _____
31. **Adjust** the demand on the spray valve in MANUAL as necessary to maintain a steady trend of RCS pressure. _____
32. **Maintain** stable conditions until EM report that they have obtained their data. _____
33. **Begin raising** demand on PK-444A to the demand value recorded in Step 3. _____
34. WHEN RCS Pressure starts to rise, THEN **secure** the 1A B/U HTR Group. _____
35. **Adjust** the demand on the spray valve in MANUAL as necessary to maintain a steady trend of RCS pressure. _____

PRESSURIZER HEATER OPERATION TO SUPPORT FNP-1-STP-938, PRESSURIZER HEATER CAPACITY CHECK

4.0 INSTRUCTIONS (continued)

36. WHEN RCS pressure returns to the stable value recorded in Step 4, THEN **check** the spray valve in MANUAL has returned to a demand approximately the same as what was recorded in Step 3. _____

37. WHEN RCS Pressure returns to the stable value recorded in Step 4, THEN **check** PK-444A has returned to a demand approximately the same value as what was recorded in Step 3. _____

38. **Return** the spray valve in MANUAL to AUTO. _____

39. **Place** PK-444A in AUTO. _____

40. **Check** that pressurizer pressure control is operating satisfactorily. _____

41. **Place** the 1B Back-Up heater group in ON. _____

42. **Lower** demand on PK-444A until demand is approximately 2-3% less than the value recorded in Step 3. _____

43. **Adjust** the demand on the spray valve in MANUAL as necessary to maintain a steady trend of RCS Pressure. _____

44. **Maintain** stable conditions until EM reports they have obtained their data. _____

45. **Begin raising** demand on PK-444A to the demand value recorded in Step 3. _____

46. WHEN RCS Pressure starts to trend up, THEN **secure** the 1B B/U HTR Group. _____

47. **Adjust** the demand on the spray valve in MANUAL as necessary to maintain a steady trend of RCS pressure. _____

48. **Begin raising** demand on PK-444A to the demand value recorded in Step 3. _____

49. **Adjust** the demand on the spray valve in MANUAL as necessary to maintain a steady trend of RCS pressure. _____

PRESSURIZER HEATER OPERATION TO SUPPORT FNP-1-STP-938, PRESSURIZER HEATER CAPACITY CHECK

4.0 INSTRUCTIONS (continued)

50. WHEN RCS pressure returns to the stable value recorded in Step 4, THEN **check** the spray valve in MANUAL has returned to a demand approximately the same as what was recorded in Step 3. _____

51. WHEN RCS Pressure returns to the stable value recorded in Step 4, THEN **check** PK-444A has returned to a demand approximately the same value as what was recorded in Step 3. _____

52. **Return** the spray valve in MANUAL to AUTO. _____

53. **Place** PK-444A in AUTO. _____

54. **Check** that pressurizer pressure control is operating satisfactorily. _____

FARLEY NUCLEAR PLANT

ANNUNCIATOR RESPONSE PROCEDURE

FNP-1-ARP-1.4

SAFETY RELATED

MAIN CONTROL BOARD ANNUNCIATOR PANEL D

PROCEDURE LEVEL OF USE CLASSIFICATION PER NMP-AP-003	
CATEGORY	**SECTIONS**
Continuous:	**ALL**
Reference:	**NONE**
Information:	**NONE**

Approved:

David L. Reed
Operations Manager

February 20, 2015
Effective Date

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DE2	1
DE3	1
DE4	1
DE5	1
DF1	1
DF2	1
DF3	4
DF4	1
DF5	1
DG1	1
DG2	1
DG3	1
DG4	1
DG5	1
DH2	1
DH3	1
DH4	1
DH5	1
DJ2	2
DJ3	1
DJ4	1
DJ5	1
DK1	1
DK2	1
DK3	1
DK4	1
DK5	1

MAIN CONTROL BOARD PANEL D

A1 1A RCP STANDPIPE LVL LO	B1	C1 RCP #1 SEAL LKOF FLOW LO	D1 RCP SEAL INJ FLOW LO	E1 REGEN HX LTDN FLOW DISCH TEMP HI
A2 1B RCP STANDPIPE LVL LO	B2	C2 RCP #1 SEAL LKOF FLOW HI	D2 RCP THRM BARR CCW FLOW HI	E2 LTDN ORIF ISO VLV IN LOCAL CONT
A3 1C RCP STANDPIPE LVL LO	B3	C3 RCP #1 SEAL LO ΔP	D3 CCW FLOW FROM RCP OIL CLRS LO	E3 LTDN ORIF ISO VLV REL LINE TEMP HI
A4 RMWST DEGAS SYS TRBL	B4 RCP SEAL WTR BYP FLOW LO	C4 SEAL WTR INJ FLTR HI ΔP	D4	E4 LTDN HX OUTLET PRESS HI
A5 1A RCP #2 SEAL LKOF FLOW HI	B5 1B RCP #2 SEAL LKOF FLOW HI	C5 1C RCP #2 SEAL LKOF FLOW HI	D5	E5 LTDN HX OUTLET FLOW HI

MAIN CONTROL BOARD PANEL D

F1 LTDN TO DEMIN DIVERTED-TEMP HI	G1 BTRS LTDN REHT HX OUTLET TEMP HI	H1	J1	K1 TOTAL RX MKUP FLOW DEV HI-LO
F2 LTDN DIVERTED TO RHT-VCT LVL HI	G2 BTRS DISCH HDR TEMP HI	H2 CHLR COMPR TRBL	J2 BABT TEMP HI-LO	K2 BA FLOW DEV HI-LO
F3 VCT LVL HI-LO	G3 BTRS CHLR SRG TK LVL HI-LO	H3 CHLR PKG IN LOCAL CONT	J3 1A OR 1B BA XFER PUMP IN LOCAL CONT	K3 AUTO MKUP START SIGNAL BLOCKED
F4 VCT PRESS HI-LO	G4 1A BAT LVL LO-LO	H4 1A BAT LVL HI-LO	J4 1A BAT TEMP LO	K4 1A BAT TEMP HI
F5 VCT TEMP HI	G5 1B BAT LVL LO-LO	H5 1B BAT LVL HI-LO	J5 1B BAT TEMP LO	K5 1B BAT TEMP HI

RECORDS

QA Record (X)	Non-QA Record (X)	Record Generated	R-TYPE
		None	H06.005

LOCATION DA1

SETPOINT: 9 inches

A1	1A RCP STANDPIPE LVL LO

ORIGIN: 1A RCP Standpipe Level Switch (N1E21LSL0406B-N)

PROBABLE CAUSE

1. 1A Reactor Coolant Pump #3 Seal normal leakage.

AUTOMATIC ACTION

NONE

OPERATOR ACTION

1. Open RMW TO PRT ISO Q1B13HV8028 ☐
2. Open 1A RCP STANDPIPE FILL ISO N1E21HV8168A ☐
3. Fill standpipe until the alarm clears ☐
4. Close 1A RCP STANDPIPE FILL ISO N1E21HV8168A ☐
5. Close RMW TO PRT ISO Q1B13HV8028. ☐

NOTE: A normally functioning seal will require a Standpipe refill every 12 to 48 hours. Seals that require a Standpipe refill in 10 hours or less may be worn or damaged. ☐

6. Record filling of RCP Standpipe in Control Room Log. ☐

References: A-177100, Sh. 181; A-181541; D-175039, Sh. 1; D-177858; D-177091, Sh. 2; PCN B91-1-7687; PLS Document; U-258242

LOCATION DA2

SETPOINT: 9 inches

ORIGIN: 1B RCP Standpipe Level Switch (N1E21LSL0407B-N)

A2	1B RCP STANDPIPE LVL LO

PROBABLE CAUSE

1. 1B Reactor Coolant Pump #3 Seal normal leakage.

AUTOMATIC ACTION

NONE

OPERATOR ACTION

1. Open RMW TO PRT ISO Q1B13HV8028 ☐
2. Open 1B RCP STANDPIPE FILL ISO N1E21HV8168B ☐
3. Fill standpipe until the alarm clears ☐
4. Close 1B RCP STANDPIPE FILL ISO N1E21HV8168B ☐
5. Close RMW TO PRT ISO Q1B13HV8028. ☐

NOTE: A normally functioning seal will require a Standpipe refill every 12 to 48 hours. Seals that require a Standpipe refill in 10 hours or less may be worn or damaged. ☐

6. Record filling of RCP Standpipe in Control Room Log. ☐

References: A-177100, Sh. 182; A-181541; D-175039, Sh. 1; D-177858; D-177091, Sh. 2; PCN B91-1-7687; PLS Document; U-258242

LOCATION DA3

SETPOINT: 9 inches

ORIGIN: 1C RCP Standpipe Level Switch (N1E21LSL0408B-N)

A3	1C RCP STANDPIPE LVL LO

PROBABLE CAUSE

1. 1C Reactor Coolant Pump #3 Seal normal leakage.

AUTOMATIC ACTION

NONE

OPERATOR ACTION

1. Open RMW TO PRT ISO Q1B13HV8028 ☐
2. Open 1C RCP STANDPIPE FILL ISO N1E21HV8168C ☐
3. Fill standpipe until the alarm clears ☐
4. Close 1C RCP STANDPIPE FILL ISO N1E21HV8168C ☐
5. Close RMW TO PRT ISO Q1B13HV8028. ☐

NOTE: A normally functioning seal will require a Standpipe refill every 12 to 48 hours. Seals that require a Standpipe refill in 10 hours or less may be worn or damaged. ☐

6. Record filling of RCP Standpipe in Control Room Log. ☐

References: A-177100, Sh. 183; A-181541; D-175039, Sh. 1; D-177858; D-177091, Sh. 2; PCN B91-1-7687; PLS Document; U-258242

LOCATION DA4

A4
RMWST DEGAS SYS TRBL

SETPOINT:

1. SETPOINT: 1. HI-HI Level (20'11" ± 1") in Vacuum Degasifier.
2. LO Level (3' 6" ± 3") in Reactor Makeup Water
3. Vacuum Degasifier Discharge Strainer HI ΔP(1 PSID ± 0.5 PSID)
4. Vacuum Degasifier LO Vacuum (5" Hg ± 1" Hg VAC)
5. Seal Water Catch Tank HI Level
6. Radwaste AHU Supply Fan not running

ORIGIN:

1. Vacuum Degasifier Level Switch N1P28LS535
2. RMW Storage Tank Low Level Alarm Relay IN. 345-1 (N1P12LA514) from N1P12LT502
3. Vacuum Degasifier Discharge Strainer Differential Pressure Switch N1P28DPS531
4. Vacuum Degasifier Vacuum Switch N1P28PS537
5. Seal Water Catch Tank Level Switch N1P28LS543
6. RAD WASTE AHU SUPP FAN Breaker EC-06 Cell Switch or Auxiliary Switch

PROBABLE CAUSE

1. HI-HI Level in the Vacuum Degasifier due to malfunction of level control valve N1P28V545 by itself or in conjunction with an improper valve lineup, a loss of degasifier transfer pump N1P28P505, or a clogged degasifier discharge strainer N1P28F505. ☐
2. Low Level in RMW Storage Tank due to level control valve Q1P12V501 malfunction, a piping rupture or improper valve lineup. ☐
3. High Vacuum Degasifier Discharge Strainer (N1P28F505) ΔP due to clogged strainer or improper DPS Valve Lineup. ☐
4. Low Vacuum in the Vacuum Degasifier due to system vacuum leak, vacuum pump failure, loss of seal water to vacuum pumps, or improper valve lineup. ☐
5. High Level in the seal water catch tank due to excessive seal water flow, improper valve lineup, loss of vacuum in degasifier or failure of level control valve N1P28V588. ☐
6. RAD WASTE AHU SUPP FAN Breaker (EC-06) tripped open or breaker not racked in. ☐

NOTE: This alarm can be deactivated by a toggle switch on the degasifier local control panel. This alarm should be deactivated when the degasifier is shut down and activated when the degasifier is running. ☐

AUTOMATIC ACTION

1. Supply Pump and Vacuum Pumps #1 and #2 tripped by N1P28LS536 on HI-HI Level (20' 11" ± 1") in Degasifier.
2. Supply Pump tripped by N1P12LA514 on Low Level (3' 6" ± 3") in RMW Storage Tank.
3. Transfer Pump tripped on N1P28DPS531 on HI ΔP (1.0 psid ± 0.5 psid) across the Vacuum Degasifier Discharge Strainer.
4. Vacuum Pumps #1 and #2 tripped by N1P28PS537 on Low Vacuum (5" Hg ± 1" Hg VAC) in the Degasifier or by EC-06 when RAD WASTE AHU SUPP FAN trips OFF.

OPERATOR ACTION

1. Have appropriate plant personnel investigate and determine cause for alarm condition. ☐

2. IF alarm condition is due to low vacuum in the degasifier OR loss of the Rad Waste AHU SUPP Fan, THEN secure the transfer pump to prevent transferring oxygenated water to the RMW Storage Tank. ☐

3. IF alarm condition is due to low level in the RMW Storage Tank, THEN secure the vacuum pumps. ☐

4. IF valid alarm condition exists, THEN commence shutdown of Degasifier Unit. ☐

5. Have appropriate plant personnel identify and correct cause for alarm condition. ☐

6. Return system to service upon correction of cause for alarm condition. ☐

References: A-177100, Sh. 184; D-170862; D-173468; U-187763; PCN SE 79-525, Rev. 8

LOCATION DA5

SETPOINT: 0.75 GPM

ORIGIN: 1A RCP #2 Seal Leakoff Flow Switch (N1E21FSH160-N)

A5	1A RCP #2 SEAL LKOF FLOW HI

PROBABLE CAUSE

1. #2 Seal hanging open.
2. Damage to #2 Seal.

AUTOMATIC ACTION

NONE

OPERATOR ACTION

1. Refer to FNP-1-AOP-4.1 ABNORMAL REACTOR COOLANT PUMP SEAL LEAKAGE. ☐
2. Submit a condition report. ☐
3. Refer to Technical Specifications, LCO 3.5.5 condition A for LCO requirements. ☐

References: A-177100, Sh. 185; A-181541; D-175039, Sh. 1; U-258242; PLS Document; Technical Specifications; Westinghouse Tech Bulletin ESBU-TB-93-01-R1

LOCATION DB4

SETPOINT: 1.1 GPM

B4	RCP SEAL WTR BYP FLOW LO

ORIGIN: RCP SEAL WTR BYPASS Q1E21HV8142 must be fully open in addition to one of the following:

1. 1A RCP Seal Bypass Flow Switch (N1E21FIS156-N)
2. 1B RCP Seal Bypass Flow Switch (N1E21FIS155-N)
3. 1C RCP Seal Bypass Flow Switch (N1E21FIS154-N)

PROBABLE CAUSE

1. RCP SEAL WTR RTN ISO Q1E21MOV8100 or Q1E21MOV8112 closed.
2. Low or Loss of Seal Water Injection flow with low Reactor Coolant System Pressure.
3. Improper setting of SEAL WTR INJECTION HIK-186.

AUTOMATIC ACTION

NONE

OPERATOR ACTION

1. Ensure proper setting of SEAL WTR INJECTION HIK-186. ☐
2. IF required, THEN increase seal water injection flow to clear the alarm. ☐
3. Monitor RCP'S Lower Radial Bearing Temperatures. ☐
4. Refer to FNP-1-SOP-1.1, REACTOR COOLANT SYSTEM. ☐

References: A-177100, Sh. 189; D-175039, Sh. 1; D-177848;U-258242; PLS Document

LOCATION DB5

SETPOINT: 0.75 GPM

ORIGIN: 1B RCP #2 Seal leakoff Flow Switch (N1E21FSH159-N)

B5	1B RCP #2 SEAL LKOF FLOW HI

PROBABLE CAUSE

1. #2 Seal Hanging open.
2. Damage to #2 Seal.

AUTOMATIC ACTION

NONE

OPERATOR ACTION

1. Refer to FNP-1-AOP-4.1 ABNORMAL REACTOR COOLANT PUMP SEAL LEAKAGE. ☐
2. Submit a condition report. ☐
3. Refer to Technical Specifications, LCO 3.5.5 condition A for LCO requirements ☐

References: A-177100, Sh. 190; A-181541; D-175039, Sh. 1; U-258242; PLS Document; Technical Specifications; Westinghouse Tech Bulletin ESBU-TB-93-01-R1

LOCATION DC1

SETPOINT: 0.95 GPM

C1	RCP #1 SEAL LKOF FLOW LO

ORIGIN:

1. 1A RCP #1 Seal Leakoff Flow Transmitter (N1E21FT156B-N)
2. 1B RCP #1 Seal Leakoff Flow Transmitter (N1E21FT155B-N)
3. 1C RCP #1 Seal Leakoff Flow Transmitter (N1E21FT154B-N)

PROBABLE CAUSE

NOTE: This annunciator has REFLASH capability. ☐

1. A differential pressure of less than 200 PSID across the #1 Seal.
2. Excessive leakage of the #2 Seal.
3. Damage to the #1 Seal.
4. Volume Control Tank pressure higher than normal.
5. Improper setting of SEAL WTR INJECTION HIK 186.
6. Shutdown Seal Actuation

AUTOMATIC ACTION

NONE

OPERATOR ACTION

1. Compare the indications of the following instruments to determine if an instrument failure has occurred or if a seal problem has developed.

   RCP SEAL LKOF HIGH RANGE recorder N1E21FR154A ☐
   RCP SEAL LEAKOFF LOW RANGE indicators FI-156B, 155B, 154B. ☐
   #1SEAL PRESSURE indicators PI-156A, 155A, 154A. ☐
   SHAFT SEAL FLOW FI-130A, 127A, 124A. ☐

   Additionally, trends in Excess Letdown parameters could be indicative of an instrument malfunction or a seal problem.
   EXC LTDN HX OUTLET TEMP, TI-139 ☐
   EXC LTDN HX OUTLET PRESS PI-138 ☐

2. Refer to FNP-1-AOP-4.1 ABNORMAL REACTOR COOLANT PUMP SEAL LEAKAGE for an actual seal problem. ☐

3. Submit a condition report. ☐

4. Refer to Technical Specifications, LCO 3.5.5 condition A, for LCO requirements. ☐

References: A-177100, Sh. 191; D-175039, Sh. 1; U-175986; U-176002; U-176032; U-258242; PLS Document; Technical Specifications; Westinghouse Tech Bulletin ESBU-TB-93-01-R1

LOCATION DC2

SETPOINT: 5 GPM

C2	RCP #1 SEAL LKOF FLOW HI

ORIGIN:

1. 1A RCP #1 Seal Leakoff Flow Transmitter (N1E21FT156A-N)
2. 1B RCP #1 Seal Leakoff Flow Transmitter (N1E21FT155A-N)
3. 1C RCP #1 Seal Leakoff Flow Transmitter (N1E21FT154A-N)

PROBABLE CAUSE

NOTE: This annunciator has REFLASH capability. ☐

1. Loss of Injection Water followed by High Seal Temperature.
2. High Temperature of the injection water supply.
3. Damage to the #1 Seal.
4. #1 Seal Ring Cocked
5. Instrument failure

AUTOMATIC ACTION

NONE

OPERATOR ACTION

1. Compare the indications of the following instruments to determine if an instrument failure has occurred or if a seal problem has developed.

   RCP SEAL LKOF HIGH RANGE recorder N1E21FR154A ☐
   RCP SEAL LEAKOFF LOW RANGE indicators FI-156B, 155B, 154B. ☐
   #1SEAL PRESSURE indicators PI-156A, 155A, 154A. ☐
   SHAFT SEAL FLOW FI-130A, 127A, 124A. ☐
   LOWER SEAL WATER BRG TEMP computer points TE0131, TE0128, TE0125 ☐
   SEAL WATER OUTLET TEMP computer points TE0132, TE0129, TE0126 ☐

   Additionally, trends in Excess Letdown parameters could be indicative of an instrument malfunction or a seal problem.
   EXC LTDN HX OUTLET TEMP, TI-139 ☐
   EXC LTDN HX OUTLET PRESS PI-138 ☐

2. Refer to FNP-1-AOP-4.1 ABNORMAL REACTOR COOLANT PUMP SEAL LEAKAGE for an actual seal problem ☐

3. Submit a condition report. ☐

4. Refer to Technical Specifications, LCO 3.5.5 condition A, for LCO requirements. ☐

References: A-177100, Sh. 192; D-175039, Sh. 1; U-175986; U-176032; U258242; PLS Document; Technical Specifications; Westinghouse letter ALA-88-811; Westinghouse Tech Bulletin ESBU-TB-93-01-R1; PCN B93-1-8652

LOCATION DC3

SETPOINT: 210 PSI

C3	RCP #1 SEAL LO ΔP

ORIGIN:

1. 1A RCP #1 Seal ΔP Transmitter (N1E21PT156-N)
2. 1B RCP #1 Seal ΔP Transmitter (N1E21PT155-N)
3. 1C RCP #1 Seal ΔP Transmitter (N1E21PT154-N)

PROBABLE CAUSE

NOTE: This annunciator has REFLASH capability. ☐

1. Low Reactor Coolant System pressure.
1. 1A, 1B or 1C RCP SEAL LEAKOFF Q1E21HV8141A, B, or C closed.

AUTOMATIC ACTION

NONE

OPERATOR ACTION

1. Compare the indications of the following instruments to determine if an instrument failure has occurred or if a seal problem has developed.

   #1SEAL PRESSURE indicators PI-156A, 155A, 154A. ☐
   RCP SEAL LKOF HIGH RANGE recorder N1E21FR154A ☐
   RCP SEAL LEAKOFF LOW RANGE indicators FI-156B, 155B, 154B. ☐
   SHAFT SEAL FLOW FI-130A, 127A, 124A. ☐

   Additionally, trends in Excess Letdown parameters could be indicative of an instrument malfunction or a seal problem.
   EXC LTDN HX OUTLET TEMP, TI-139 ☐
   EXC LTDN HX OUTLET PRESS PI-138 ☐

2. Refer to FNP-1-AOP-4.1 ABNORMAL REACTOR COOLANT PUMP SEAL LEAKAGE for an actual seal problem ☐

3. Submit a condition report. ☐

4. Refer to FNP-1-SOP-1.1, REACTOR COOLANT SYSTEM ☐

5. Refer to Technical Specifications, LCO 3.5.5 condition A, for LCO Requirements. ☐

References: A-177100, Sh. 193; D-175039, Sh. 1; U-175985; U-176001; U-176031; U-258242; PLS Document; Technical Specifications

LOCATION DC4

SETPOINT: 20 PSID

C4
SEAL WTR INJ FLTR HI ΔP

ORIGIN:

1. Diff. Pressure Switch (N1E21PIS0157A-N)
2. Diff. Pressure Switch (N1E21PIS0157B-N)

PROBABLE CAUSE

1. Seal Water Injection Filter 1A or 1B clogged.
2. High seal injection flow rate.
3. Chg Flow Q1E21FCV122 failed closed.

AUTOMATIC ACTION

NONE

CAUTIONS: To prevent possible over pressurization and failure of a clogged seal injection filter, no attempt to raise seal injection flow should be made while annunciator is in. ☐

Seal injection must not be isolated if CCW cooling to the thermal barrier is not available. ☐

NOTE: Performance of the following steps may result in isolation of seal injection. This may be necessary to preclude possible collapse of a seal injection filter that may result from excessive ΔP. ☐

OPERATOR ACTION

1. IF seal injection flow rate is high, THEN reduce to normal value. ☐

2. IF alarm NOT cleared by previous step, THEN dispatch appropriate personnel to perform the following:
   - 2.1 observe actual Seal Injection Filter ΔP. ☐
   - 2.2 IF filter ΔP is visibly rising, THEN isolate all seal injection flow by closing the following valves:
     - 1A SEAL WATER INJ FILTER INLET Q1E21V127A AND Q1E21V127C ☐
     - 1A SEAL WATER INJ FILTER OUTLET Q1E21V130A AND Q1E21V130C ☐
     - 1B SEAL WATER INJ FILTER INLET Q1E21V127B AND Q1E21V127D ☐
     - 1B SEAL WATER INJ FILTER OUTLET Q1E21V130B AND Q1E21V130D ☐
   - 2.3 IF ΔP is stable, THEN place the standby seal injection filter in service per FNP-1-SOP-2.1. ☐

OPERATOR ACTION CONT'D

NOTE: Per the Westinghouse Technical Manual, RCP operation without seal injection is limited to 24 hours. This is a conservative recommendation intended to limit the probability of a combined loss of CCW cooling and injection flow. ☐

3. IF seal injection has been isolated, THEN perform the following:
   - 3.1 Closely monitor RCP parameters. ☐
   - 3.2 Determine the cause of filter clogging, replace clogged filters, and return seal injection to service as soon as possible. ☐

4. IF on-service filter has been swapped, THEN perform the following:
   - 4.1 Closely monitor ΔP until it stabilizes. ☐
   - 4.2 IF ΔP with standby filter in service does NOT stabilize at < 20 psid, THEN isolate all seal injection flow by closing the following valves:

     - 1A SEAL WATER INJ FILTER INLET Q1E21V127A AND Q1E21V127C ☐
     - 1A SEAL WATER INJ FILTER OUTLET Q1E21V130A AND Q1E21V130C ☐
     - 1B SEAL WATER INJ FILTER INLET Q1E21V127B AND Q1E21V127D ☐
     - 1B SEAL WATER INJ FILTER OUTLET Q1E21V130B AND Q1E21V130D ☐

5. IF seal injection filters were swapped, THEN notify appropriate personnel to replace the clogged filter. ☐

References: A-177100, Sh. 194; D-175039, Sh. 2; PLS Document; Westinghouse Tech Bulletin NSD-TB-91-07-R1

LOCATION DC5

SETPOINT: 0.75 GPM

C5	1C RCP #2 SEAL LKOF FLOW HI

ORIGIN: 1C RCP #2 Seal Leakoff Flow Switch (N1E21FSH158-N)

PROBABLE CAUSE

1. #2 Seal hanging open.
2. Damage to #2 seal.

AUTOMATIC ACTION

NONE

OPERATOR ACTION

1. Refer to FNP-1-AOP-4.1 ABNORMAL REACTOR COOLANT PUMP SEAL LEAKAGE for an actual seal problem. ☐
2. Submit a condition report. ☐
3. Refer to Technical Specifications, LCO 3.5.5 condition A for LCO requirements ☐

References: A-177100, Sh. 195; A-181541; D-175039, Sh. 1; U-258242; PLS Document; Technical Specifications; Westinghouse Tech Bulletin ESBU-TB-93-01-R1.

LOCATION DD1

D1	RCP SEAL INJ FLOW LO

SETPOINT: 6.7 GPM

ORIGIN:

1. 1A RCP Seal Water Injection Flow Transmitter (Q1E21FT0130-N)
2. 1B RCP Seal Water Injection Flow Transmitter (Q1E21FT0127-N)
3. 1C RCP Seal Water Injection Flow Transmitter (Q1E21FT0124-N)

PROBABLE CAUSE

NOTE: This annunciator has REFLASH capability. ☐

1. All Charging Pumps stopped.
2. Improper setting on SEAL WTR INJECTION HIK-186.
3. Clogging seal injection filter.

AUTOMATIC ACTION

NONE

OPERATOR ACTION

1. IF a loss of seal injection flow has occurred AND a loss of Component Cooling Water to the Thermal Barrier Heat Exchanger has occurred AND at least one method of seal cooling cannot be immediately restored, THEN go to FNP-1-AOP-4.1, ABNORMAL REACTOR COOLANT PUMP SEAL LEAKAGE. ☐
2. Determine the cause of the alarm. ☐
3. For a CVCS malfunction, go to FNP-1-AOP-16.0, CVCS MALFUNCTION ☐
4. Monitor RCP lower bearing temperatures and #1 Seal Leakoff Flows. ☐

CAUTION: No attempt to raise seal injection flow should be made if annunciator DC4, SEAL WTR INJ FLTR HI ΔP, is in alarm to prevent possible over pressurization and failure of a clogged seal injection filter. ☐

5. IF seal injection flow is low AND annunciator DC4, Seal WTR INJ FLTR HI ΔP, is NOT in alarm, THEN re-establish proper injection flow by opening SEAL WTR INJECTION HIK-186. ☐

OPERATOR ACTION CONT'D

6. IF operation of SEAL WTR INJECTION HIK-186 is erratic and operation via the bypass is desired, THEN refer TO FNP-1-SOP-2.1, CHEMICAL AND VOLUME CONTROL SYSTEM PLANT STARTUP AND OPERATION, Section 4.16 for guidance. ☐

7. Check the on-service Seal Injection Filter ΔP. ☐

CAUTIONS: RCP's with #1 Seal Leakoff less than 2.5 gpm may develop lower bearing and seal temperatures that exceed 225°F within 1 to 2 hours following a loss of seal injection. ☐

Long term operation of the RCP under loss of seal injection conditions increases the risk of a loss of all seal cooling incident if the CCW system supply to the RCP thermal barrier should also fail. ☐

RCS water being cooled by the RCP thermal barrier contains particulate matter, since it is not filtered, which can have an impact on the long term operability of the RCP seals. ☐

Particulate matter which will deposit in the seal package as the result of a loss of seal injection will be radioactive and will impact dose to received by workers during repair efforts. ☐

8. IF a Loss of Seal Injection Flow has occurred, THEN;
   a) Ensure that RCP, Component Cooling Water inlet temperature remains below 105°F. ☐
   b) Ensure that at least one Charging Pump is running. ☐
   c) Carefully re-establish the Injection Water Flow, reducing the RCP Lower Bearing Temperatures at a maximum rate of 1°F per minute, using SEAL WTR INJECTION HIK 186, or by establishing flow via HI-186 bypass using FNP-1-SOP-2.1, CHEMICAL AND VOLUME CONTROL SYSTEM PLANT STARTUP AND OPERATION, Section 4.16 for guidance. ☐

OPERATOR ACTION CONT'D

CAUTION:
- **If at any time the seal package reaches 250°F, it is likely the Shutdown Seal has actuated and must be replaced.** ☐
- **Closure of the #1 seal leakoff line will impede the operator's ability to determine if the Shutdown Seal has actuated. Alternate means such as calculated flow into the RCDT must be used.** ☐

9. IF a Loss of Seal Injection Flow has occurred, THEN;
   a) IF the bearing or seal water outlet temperature for any operating RCP reaches 225°F, THEN:
      1. Manually trip the reactor, and perform the next steps concurrently with FNP-1-EEP-0, REACTOR TRIP OR SAFETY INJECTION. ☐
      2. Secure the affected RCP. ☐
      3. WHEN RCP has come to a complete stop as indicated by minimum RCS flow in the affected loop, THEN close the 1A (B or C) RCP Seal Leakoff Q1E21HV8141A (B or C) for the affected RCP. ☐
      4. IF 1A or 1B RCP is secured, THEN close the pressurizer spray valve for the affected RCP (PK-444C for 1A RCP, PK-444D for 1B RCP) ☐
   b) Monitor lower bearing or seal water outlet temperatures of any operating RCPs paying particular attention to those RCPs with pre-event seal leakoffs of < 2.5 gpm. ☐

1. IF bearing or seal water outlet temperature of any operating RCP reaches 190°F, and continues to rise, THEN initiate a controlled reactor shutdown using the guidance of FNP-1-UOP-3.1, POWER OPERATION or FNP-1-AOP-17.1, RAPID TURBINE POWER REDUCTION, as deemed necessary. ☐
2. WHEN the reactor is shutdown, THEN secure the affected RCP. ☐
3. WHEN RCP has come to a complete stop as indicated by minimum RCS flow in affected loop, THEN close the 1A (B or C) RCP Seal Leakoff Q1E21HV8141A (B or C) for the affected pump. ☐
4. IF 1A or 1B RCP is secured, THEN close the pressurizer spray valve for the affected RCP (PK-444C for 1A RCP, PK-444D for 1B RCP). ☐

References: A-177100, Sh. 196; D-175039, Sh. 1 & 2; PLS Document; U-175985; U-176001; U-176031; U-258242. {CMT 0003153} {CMT 0005756} {CMT 0007558} {CR-1-2000-257}

LOCATION DD2

SETPOINT: 160 ± 2 GPM

D2	RCP THRM BARR CCW FLOW HI

ORIGIN: 49x, Aux. Contact activated by Flow Switch (Q1P17FISH3045-A)

PROBABLE CAUSE

1. Rupture of a RCP Thermal Barrier Heat Exchanger.

AUTOMATIC ACTION

1. Closes CCW FROM RCP THRM BARR Q1P17HV3045.

NOTE: Failure of a RCP #1 Seal may result in isolation of CCW to the Thermal Barrier Heat Exchangers due to local boiling in the Thermal Barrier of the affected pump, caused by High #1 Seal Leakoff Flow. ☐

OPERATOR ACTION

1. IF a loss of seal injection flow has occurred AND a loss of Component Cooling Water to the Thermal Barrier Heat Exchanger has occurred AND at least one method of seal cooling cannot be immediately restored, THEN go to FNP-1-AOP-4.1, ABNORMAL REACTOR COOLANT PUMP SEAL LEAKAGE. ☐

2. Determine the cause of the alarm. ☐

3. Closely monitor seal injection water flows, Seal Injection Water Temperatures and RCP Lower Bearing Temperatures. ☐

NOTE: Proper RCP Seal Injection Water Flow and Seal Injection Water Temperature should provide adequate cooling for the RCP's Seals and Lower Bearings. ☐

4. Notify appropriate personnel ☐

5. Shutdown the plant and repair the affected Thermal Barrier Heat Exchanger as soon as possible. ☐

References: A-177100, Sh. 197; B-175968, Pg. 6; D-175002, Sh. 2;D-177854; U-258242 NEL 98-0327

LOCATION DD3

SETPOINT: 100 + 10 GPM
- 0

ORIGIN:
1. Flow Switch (Q1P17FISL3048A-N)
2. Flow Switch (Q1P17FISL3048B-N)
3. Flow Switch (Q1P17FISL3048C-N)

D3
CCW FLOW FROM RCP OIL CLRS LO

PROBABLE CAUSE

NOTE: Following entry into Mode 6 during a refueling outage, it is common to receive alarm DD3 due to low discharge pressure on the O/S pump when aligned to the SFP and RHR HXs, and the RHR seal and charging pump oil coolers.
AI 2009203964 ☐

1. Loss of Component Cooling Water.
2. Loss of Component Cooling Water Flow to the RCP's due to Phase "B" isolation signal.
3. Improper valve lineup.

AUTOMATIC ACTION

NONE

OPERATOR ACTION

1. Determine the cause of the alarm. ☐

2. IF a loss of Component Cooling Water has occurred, THEN perform the actions required by FNP-1-AOP-9.0, LOSS OF COMPONENT COOLING WATER. ☐

3. Closely monitor the RCP's Motor Bearing Temperatures. ☐

NOTE: On a complete Loss of CCW Flow to RCP Motor Bearing Oil Coolers, the bearing temperature will exceed 195°F in approximately 2 minutes. ☐

4. IF any RCP Motor Bearing Temperature exceeds 195°F, THEN:
   A. IF the Reactor is critical, THEN trip the reactor. ☐
   B. Stop the RCP. ☐
   C. Perform the actions required by FNP-1-EEP-0, REACTOR TRIP OR SAFETY INJECTION. ☐
   D. Perform action of FNP-1-AOP-4.0, LOSS OF REACTOR COOLANT FLOW as time allows. ☐

5. Correct the cause of the alarm and return flow to normal. ☐

References: A-177100, Sh. 198; B-175968, Pg. 6 & 7; D-175002, Sh. 2; U-258242

LOCATION DE1

SETPOINT: 365°F

E1	REGEN HX LTDN FLOW DISCH TEMP HI

ORIGIN: Temperature Bistable TB-140 from Temperature Element (N1E21TE140-N)

PROBABLE CAUSE

1. Low Charging Flow.

AUTOMATIC ACTION

NONE

OPERATOR ACTION

CAUTION: If actual VCT level is low, refer to annunciator DF3. (SOER 97-1) ☐

1. Determine actual letdown flow temperature as indicated by TI-140 (REGEN HX Outlet Temp) on the MCB. ☐
2. Monitor charging and letdown flows and temperatures. ☐
3. IF the cause is determined to be a CVCS malfunction, THEN go to FNPAOP-16.0, CVCS MALFUNCTION. ☐
4. Refer to FNP-1-SOP-2.1, CHEMICAL AND VOLUME CONTROL SYSTEM PLANT STARTUP AND OPERATION. ☐
5. IF operating at a minimum Charging Flow rate, THEN;
   a) Verify that the Letdown Flow is being cooled below 380°F. ☐
   b) Adjust Charging or Letdown Flow, if required, to lower the temperature. ☐
6. Correct the cause of the alarm and return the system to normal as soon as possible. ☐

References: A-177100, Sh. 201; D-175039, Sh. 1; U-175992; PLS Document

LOCATION DE2

SETPOINT: Not Applicable

E2	LTDN ORIF ISO VLV IN LOCAL CONT

ORIGIN:

1. Selector Switch (Q1E21HS8149AC-A)
2. Selector Switch (Q1E21HS8149BC-A)
3. Selector Switch (Q1E21HS8149CC-A)

PROBABLE CAUSE

1. The Selector Switch at the Hot Shutdown Panel is in the Local position for one or more of the following valves:
   a) Q1E21HV8149A
   b) Q1E21HV8149B
   c) Q1E21HV8149C

AUTOMATIC ACTION

NONE

OPERATOR ACTION

1. No action is necessary if alarm is due to preplanned operational or maintenance activities; otherwise send appropriate personnel to determine the cause of the alarm. ☐

2. Return the valve to Remote Control as soon as possible. ☐

References: A-177100, Sh. 202; D-175039, Sh.1; D-177376; D-177377; D-177378

LOCATION DE3

SETPOINT: 165 ± 2°F

E3	LTDN ORIF ISO VLV REL LINE TEMP HI

ORIGIN: Temperature Bistable TB-141 from Temperature Element (N1E21TE141-N)

PROBABLE CAUSE

1. LTDN ORIF OUTLET REL VLV, Q1E21V255, leaking or lifted.
2. LP LTDN PRESS PK-145 malfunction.

AUTOMATIC ACTION

NONE

OPERATOR ACTION

CAUTION: If actual VCT level is low, refer to annunciator DF3. (SOER 97-1) ☐

1. Monitor the LTDN ORIF ISO REL line to PRT Temperature (TI-141) and LTDN HX Outlet Press (PI- l45). ☐

2. IF the high temperature is due to LP LTDN press PK-145 malfunctions, THEN place valve controller in manual and adjust as required. ☐

3. IF temperature continues to rise rapidly indicating a lifted relief valve, THEN close LTDN ORIF ISO 45 (60) GPM Q1E21HV8149A, B AND C. ☐

NOTE: Transients that will require boration or dilution should be avoided if letdown has been secured. ☐

4. IF a ramp is in progress, THEN place turbine load on HOLD. ☐

5. Go to FNP-1-AOP-16.0, CVCS MALFUNCTION to address the loss of letdown flow. ☐

References: A-177100, Sh. 203; D-175039, Sh. 1; U-176024; PLS Document

LOCATION DE4

SETPOINT: 462 PSIG

ORIGIN: Pressure Bistable PB-145 from Pressure Transmitter (Q1E21PT145)

E4	LTDN HX OUTLET PRESS HI

PROBABLE CAUSE

1. LP LTDN PRESS PK-145 malfunction.
2. All three Letdown Orifice Isolation Valves open.

AUTOMATIC ACTION

NONE

OPERATOR ACTION

CAUTION: If actual VCT level is low, refer to annunciator DF3. (SOER 97-1) ☐

1. Monitor LTDN HX Outlet Flow (FI-150) and LTDN HX Outlet Press (PI-145). ☐
2. Ensure proper orifice isolation valve selection. ☐
3. IF the high pressure is due to LP LTDN PRESS PK-145 malfunction, THEN place valve controller in manual and attempt to reduce the pressure. ☐
4. IF pressure can NOT be controlled manually with LP LTDN PK-145, THEN close LTDN ORIF ISO 45 (60) GPM Q1E21HV8149A, B, and C. ☐

NOTE: Transients that will require boration or dilution should be avoided if letdown has been secured. ☐

5. IF a ramp is in progress, THEN place turbine load on HOLD. ☐
6. Go to FNP-1-AOP-16.0, CVCS MALFUNCTION to address the loss of letdown flow. ☐

References: A-177100, Sh. 204; D-175039, Sh. 1&2; U-176018; PLS Document

LOCATION DE5

SETPOINT: 140 GPM

ORIGIN: Flow Bistable FB-150 from Flow Transmitter (Q1E21FT150)

E5	LTDN HX OUTLET FLOW HI

PROBABLE CAUSE

1. All three Letdown Orifice Isolation Valves open.
2. LP LTDN PRESS PK-145 failed open.

AUTOMATIC ACTION

NONE

NOTES:
- **The normal flow rate for letdown is 60 GPM and the maximum is 135 GPM. FSAR Table 9.3.5** ☐
- **At 135°F ann DF1 should alarm and TCV-143 should divert to the VCT.** ☐

OPERATOR ACTION

1. Monitor the following:
   - LTDN HX Outlet Flow (FI-150) ☐
   - LTDN HX Outlet Press (PI-145). ☐
2. Ensure proper orifice isolation valve selection. ☐
3. IF LP LTDN PRESS PK-145 has failed, THEN place valve controller in manual and attempt to reduce letdown flow below 135 GPM. ☐
4. IF proper letdown flow can NOT be maintained, THEN close LTDN ORIF ISO 45 (60) GPM Q1E21HV8149A, B, and C. ☐

NOTE: Transients that will require boration or dilution should be avoided if letdown has been secured. ☐

5. IF a ramp is in progress, THEN place turbine load on HOLD. ☐
6. Go to FNP-1-AOP-16.0, CVCS MALFUNCTION to address the loss of letdown flow. ☐

References: A-177100, Sh. 205; D-175039, Sh. 1&2; U-176019; PLS Document U-258631; PCN B-87-1-4353

LOCATION DF1

SETPOINT: 135°F

ORIGIN: 1-TY-143X Auxiliary Relay actuated by Temperature Bistable (N1E21TB143)

F1	LTDN TO DEMIN DIVERTED-TEMP HI

PROBABLE CAUSE

1. Low or Loss of CCW Flow to the Letdown Heat Exchanger.
2. Letdown Flow greater than Charging Flow.

AUTOMATIC ACTION

1. Letdown High Temperature Divert Valve Q1E21TCV143 diverts Letdown Flow to the VCT. {CMT 0008644}

OPERATOR ACTION

1. Verify Q1E21TCV143 has diverted letdown flow to VCT to bypass demins ☐
2. Monitor charging and letdown flows and temperatures. ☐
3. Take manual control of LTDN HX Outlet Temp TK-144 and attempt to increase CCW flow to the Letdown Heat Exchanger. ☐
4. Adjust charging or letdown flow as required to reduce the letdown flow temperature. ☐
5. IF cause for the elevated temperature has been corrected, THEN refer to FNP-1-SOP-2.1, CHEMICAL AND VOLUME CONTROL SYSTEM PLANT STARTUP AND OPERATION to return TCV143 to DEMIN. ☐
6. IF letdown temperature can NOT be reduced, THEN close LTDN ORIF ISO 45 (60) GPM Q1E21HV8149A, B, and C. ☐

NOTE: Transients that will require boration or dilution should be avoided if letdown has been secured. ☐

7. IF a ramp is in progress, THEN place turbine load on HOLD ☐
8. Go to FNP-1-AOP-16.0, CVCS MALFUNCTION to address the loss of letdown flow. ☐

References: A-177100, Sh. 206; D-175039, Sh.2; D-177091; D-177375; U-175997; PLS Document

LOCATION DF2

SETPOINT: 81% Level

F2	LTDN DIVERTED TO RHT-VCT LVL HI

ORIGIN: 1-LY-115AX Auxiliary Relay actuated by Level Bistable (NlE2lLBll5A)

PROBABLE CAUSE

1. Letdown flow greater than charging flow.
2. Normal Primary Plant heatup.
3. LT-115 failed high.
4. LCV-115A selected to VCT.
5. CVCS makeup addition in progress.

AUTOMATIC ACTION

1. VCT HI LVL DIVERT VLV Q1E21LCV115A diverts Letdown Flow to the Recycle Holdup Tank.

OPERATOR ACTION

1. Determine actual VCT level as indicated by LI-115 and LI-112B on the MCB. ☐

2. Verify that VCT HI LVL Divert VLV Q1E21LCV115 has diverted flow to the Recycle Holdup Tank. ☐

3. Verify proper charging and letdown flows. ☐

4. Observe CHG HDR PRESS indicator PI-121 and the running Charging Pump Motor Ammeter to ensure proper pump operation. (SOER 97-1) ☐

5. IF LT-115 has failed high, THEN;
   a) Place VCT divert valve 115A in the VCT mode ☐
   b) Manually makeup to VCT for VCT level control ☐
   c) IF VCT level decreases to 5%, THEN open RWST to charging pump suctions and close VCT outlet isolations ☐
   d) The following automatic actions are inhibited
      1) Auto VCT/RCS makeup ☐
      2) Auto opening of RWST to charging pump suction on VCT low level ☐
      3) Auto VCT outlet isolations closing on lo VCT level
   e) Initiate steps to have the instrumentation repaired (SOER 97-1 ☐

References: A-177100, Sh. 207; D-175039, Sh. 2; PLS Document; U-169636; U-175989

LOCATION DF3

SETPOINT: 1. High: 76% Level
2. Low: 15% Level

ORIGIN: 1. Level Bistable LB-115D from Level Transmitter (Q1E21LT115)
2. Level Bistable LB-112B from Level Transmitter (Q1E21TC112)

F3
VCT
LVL
HI-LO

PROBABLE CAUSE

NOTE: Zinc Addition System (ZAS) injection will result in a continuous addition of as much as 1.7 gallons per hour to the VCT, when the system is in service.

1. High Level
   - VCT HI LVL DIVERT VLV Q1E21LCV115 malfunction or positioned to the VCT position.
   - Makeup Flow and/or Letdown flow rate greater than Charging Flow rate.
   - LT-115 or LT-112 failed high.
   - Normal plant heat-up.
   - CVCS makeup addition in progress.

2. Low Level
   - Makeup Control not in automatic.
   - VCT HI LVL DIVERT VLV Q1E21LCV115 malfunction or positioned to the Holdup Tank position.
   - Chemical and Volume Control System leak.
   - LT-115 or LT-112 failed Low.

AUTOMATIC ACTION

1. LT-112
   - Modulates LCV-115A from fully closed at VCT level of 71% to fully open at VCT level of 81%.
   - Shifts charging pumps suction to RWST at 5% VCT Lo-Lo level (with LT-115),
   - Hi alarms at 76%, Lo alarms at 15%.

AUTOMATIC ACTION (Cont'd)

2. LT-115

   - LT-115 fully diverts LCV-115A at 81% VCT level.
   - Shifts charging pumps suction to RWST at 5% VCT Lo-Lo level (with LT-112)
   - Starts auto makeup at 20% VCT level; stops auto makeup at 40% VCT level
   - Hi alarms at 76%, Lo alarms at 15%.

OPERATOR ACTION

1. Determine if level is high or low as indicated by LI-115 and LI-112B on the MCB. **{CMT 0006813}** ☐

2. IF actual level is high, THEN:
   - 2.1 Stop makeup. ☐
   - 2.2 Place VCT HI LVL Divert VLV Q1E21LCV115A to the HU TK position until the desired level is reached. ☐
   - 2.3 Have CHM secure ZAS. **{CMT 0006813}** ☐

3. IF actual level is low, THEN
   - 3.1 Initiate makeup. ☐
   - 3.2 Turn VCT HI LVL Divert VLV Q1E21LCV115A to the VCT position. ☐
   - 3.3 IF necessary, THEN notify appropriate personnel to locate and isolate system leakage. **{CMT 0006813}** ☐
   - 3.4 IF desired, and with SS permission, align charging pump suction to the RWST as follows:
     - 3.4.1 RWST TO CHG PUMP
       - [ ] Q1E31LCV115B open. ☐
       - [ ] Q1E21LCV115D open. ☐
     - 3.4.2 VCT OUTLET ISO
       - [ ] Q1E21LCV115C closed. ☐
       - [ ] Q1E21LCV115E closed. ☐
     - 3.4.3 Refer to FNP-1-AOP-1.0, FNP-1-AOP-2.0 and/or FNP-1-AOP-17.1 as appropriate. ☐
   - 3.5 IF level indication is lost OR it is suspected that the lower level tap has been uncovered, THEN ensure level instruments are properly vented after level has been recovered and stabilized. **{AI 2006203596}** ☐

OPERATOR ACTION CONT'D

4. IF the alarm is due to a Charging or Letdown malfunction, THEN go to FNP-1-AOP-16.0, CVCS MALFUNCTION to address the loss of letdown flow. ☐

5. Observe CHG HDR PRESS indicator PI-121 and the running Charging Pump Motor Ammeter to ensure proper pump operation. (SOER 97-1) {CMT 0006813} ☐

6. Refer to FNP-1-SOP-2.3, CHEMICAL AND VOLUME CONTROL SYSTEM REACTOR MAKEUP CONTROL SYSTEM. ☐

NOTE: The following automatic actions are inhibited:
- **Opening of RWST to charging pump suctions on lo-lo VCT level.** ☐
- **Closing of VCT outlet isolations.** ☐
- **Auto VCT/RCS makeup.** ☐

7. IF LI-115 has failed high, THEN:
   - 7.1 Place VCT HI LVL DIVERT VLV Q1E21LCV115A in the VCT position. ☐
   - 7.2 Manually makeup for VCT level control. ☐
   - 7.3 IF VCT level decreases to 5%, THEN align charging pump suction to the RWST as follows:
     - 7.3.1 RWST TO CHG PUMP
       - [ ] Q1E31LCV115B open. ☐
       - [ ] Q1E21LCV115D open. ☐
     - 7.3.2 VCT OUTLET ISO
       - [ ] Q1E21LCV115C closed. ☐
       - [ ] Q1E21LCV115E closed. ☐
     - 7.3.3 Refer to FNP-1-AOP-1.0, FNP-1-AOP-2.0 and/or FNP-1-AOP-17.1 as appropriate. ☐

NOTE: The following automatic actions are inhibited:

- **Opening of RWST to charging pump suctions on lo-lo VCT level.** ☐
- **Closing of VCT outlet isolations.** ☐

8. IF LI-112 has failed high, THEN:
   - 8.1 Place Q1E21LCV115A, VCT HI LVL DIVERT VLV in the VCT position. ☐
   - 8.2 Manually makeup to VCT, as required to restore level. ☐
   - 8.3 Place LK-112 VCT level controller to manual and adjust to 0 demand. ☐
   - 8.4 Control VCT level by ONE of the following methods:
     - 8.4.1 Alternately place Q1E21LCV115A, VCT HI LVL DIVERT VLV between VCT, AUTO, and RHT positions, as required. ☐
     - 8.4.2 Place Q1E21LCV115A, VCT HI LVL DIVERT VLV in AUTO and manually adjust LK112 VCT level controller to maintain level. ☐
   - 8.5 IF VCT level decreases to 5%, THEN align charging pump suction to the RWST by the following:
     - 8.5.1 RWST TO CHG PUMP
       - [ ] Q1E31LCV115B open. ☐
       - [ ] Q1E21LCV115D open. ☐
     - 8.5.2 VCT OUTLET ISO
       - [ ] Q1E21LCV115C closed. ☐
       - [ ] Q1E21LCV115E closed. ☐
     - 8.5.3 Refer to FNP-1-AOP-1.0, FNP-1-AOP-2.0 and/or FNP-1-AOP-17.1 as appropriate. ☐

9. IF LI-115 has failed low, THEN:
   - 9.1 Manually makeup for VCT level control. ☐
   - 9.2 Take manual control of the make-up system. ☐

10. IF LI-112 has failed low, THEN:
    - 10.1 Take LK-112 VCT level controller to manual and adjust as necessary ☐
    - 10.2 IF necessary, THEN position VCT HI LVL DIVERT VLV Q1E21LCV115A hand switch to desired position. ☐

11. IF LI-112 or LI-115 has failed, THEN initiate steps to have the instrumentation repaired. (SOER 97-1 ☐

References: A-177100, Sh. 208; D-175039, Sh. 2; PLS Document; U-169636; U-175989; U-260610

LOCATION DF4

SETPOINT: 1. High: 65 PSIG
2. Low: 12 PSIG

ORIGIN: 1. Pressure Bistable PB-117A from Pressure Transmitter (N1E21PT117)
2. 1-PY-117BX Auxiliary Relay from Pressure Transmitter (N1E21PT117)

F4
VCT PRESS HI-LO

PROBABLE CAUSE

NOTE: Zinc Addition System (ZAS) injection will result in a continuous addition of as much as 1.7 gallons per hour to the VCT, when the system is in service. ☐

1. High Pressure
   a) High VCT Level.
   b) H_2 or N_2 Pressure Regulator malfunction.
2. Low Pressure
   a) H_2 or N_2 Pressure Regulator malfunction.
   b) Vent valve malfunction (Q1E21PCV8157 or Q1G22PCV7800)
   c) Volume Control Tank, pressure control system leak.

AUTOMATIC ACTION

1. Closes Volume Control Tank Purge Isolation Valve Q1G22PCV1092.

OPERATOR ACTION

1. Determine if pressure is high or low as indicated by PI-117, on the MCB. ☐
2. Monitor VCT level and pressure. ☐
3. IF the VCT level is high, THEN refer to FNP-1-SOP-2.3, CHEMICAL AND VOLUME CONTROL SYSTEM REACTOR MAKEUP CONTROL SYSTEM. ☐
4. IF VCT level is normal, THEN refer to FNP-1-SOP-2.5, RCS CHEMICAL ADDITION, VCT GAS CONTROL AND DEMINERALIZER OPERATION. ☐
5. Notify appropriate personnel to locate and isolate system leakage if necessary. ☐
6. IF the low pressure event is a result of a VCT low level, in which the level indication is lost OR it is suspected that the lower level tap has been uncovered, THEN ensure the level instruments are properly vented after the event. **{AI2006203596}** ☐

References: A-177100, Sh. 209; D-175039, Sh. 2; D-175042, Sh. 5; PLS Document; D-177303; D-177514; U-260610; U-176006

LOCATION DF5

SETPOINT: 111°F

F5
VCT TEMP HI

ORIGIN: Temperature Bistable TB-116 from Temperature Element (N1E21TE116)

PROBABLE CAUSE

1. Letdown flow greater than Charging flow.
2. Low CCW flow to the Letdown Heat Exchanger, Excess Letdown Heat Exchanger or Seal Water Heat Exchanger
3. LTDN HX OUTLET TEMP TK 144 malfunction.

AUTOMATIC ACTION

NONE

OPERATOR ACTION

1. Monitor VCT TEMP TI-116, Letdown HX Outlet Flow FI-150 and LTDN HX TEMP Divert TI-143. ☐
2. Determine the cause of the alarm. ☐
3. IF the cause is low CCW flow, THEN refer to FNP-1-SOP-23.0, COMPONENT COOLING WATER SYSTEM. ☐
4. Adjust charging or letdown flow as required to reduce the Letdown Flow Temperature. ☐
5. Adjust LTDN HX Outlet TEMP TK-144 as required to maintain VCT Temperature < 111°F. ☐
6. IF the elevated VCT temperature is determined to be from letdown, THEN isolate letdown before exceeding 130°F seal injection flow. ☐
7. Refer to FNP-1-SOP-2.1, CHEMICAL AND VOLUME CONTROL SYSTEM PLANT STARTUP AND OPERATION. ☐
8. Correct the cause of the alarm as soon as possible. ☐

References: A-177100, Sh. 210; D-175039, Sh. 2; PLS Document;U-176005; U-206610

LOCATION DG1

SETPOINT: 155°F

G1	BTRS LTDN REHT HX OUTLET TEMP HI

ORIGIN: Temperature Bistable TB-381 from Temperature Element (N1G12TE381)

PROBABLE CAUSE

1. Malfunction of LTDN REHT HX OUTLET TEMP TK-381A controller.

AUTOMATIC ACTION

NONE

OPERATOR ACTION

1. Determine actual LTDN REHT HX Outlet TEMP as indicated by TI-381, on the MCB. ☐
2. Take manual control of LTDN REHT HX Outlet TEMP TK-381A and attempt to reduce the temperature by closing the valve. ☐
3. IF temperature can NOT be reduced, THEN place the BTRS Mode SEL Switch N1G12HS2102G to the off position. ☐
4. IF Letdown Reheat Heat Exchanger Outlet Temperature reaches 160°F, THEN verify that LTDN HI TEMP Divert VLV Q1E21TCV143 diverts letdown flow to the VCT. ☐
5. Refer to FNP-1-SOP-3.0, BORON THERMAL REGENERATION SYSTEM. ☐
6. Notify appropriate personnel to locate and correct the fault. ☐
7. Return the Boron Thermal Regeneration System to normal. ☐

References: A-177100, Sh. 211; D-175039, Sh. 2; D-175040; D-177519; D-177176; PLS Document; U-176012; U-260610

LOCATION DG2

SETPOINT: 115°F

G2
BTRS DISCH HDR TEMP HI

ORIGIN: Temperature Bistable TB-386 from Temperature Element (N1G12TE386)

PROBABLE CAUSE

1. Letdown Chiller Heat Exchanger, CVCS RTN HDR TEMP TK-386 malfunction.
2. Chilled Water Package tripped.

AUTOMATIC ACTION

NONE

OPERATOR ACTION

1. Determine actual BTRS RTN HDR Temperature as indicated by TI-386, on the MCB. ☐
2. Take manual control of CVCS RTN HDR TEMP TK-386, and attempt to reduce the temperature by opening the valve. ☐
3. IF temperature can NOT be reduced, THEN place the BTRS Mode SEL Switch N1G12HS2102G to the OFF position. ☐
4. Refer to FNP-1-SOP-3.0, BORON THERMAL REGENERATION SYSTEM. ☐
5. Notify appropriate personnel to locate and correct the fault. ☐
6. Return the Boron Thermal Regeneration System to normal. ☐

References: A-177100, Sh. 212; D-175040; D-177176; PLS Document;U-176021; U-260610

LOCATION DG3

SETPOINT: 1. High: 85% Level
2. Low: 45% Level

ORIGIN: Level Bistable LB-380 from Level Transmitter (N1G12LT380)

G3
BTRS CHLR SRG TANK LVL HI-LO

PROBABLE CAUSE

1. High Level
   a) Letdown Chiller Heat Exchanger tube rupture.
   b) Demineralized Water Supply Valve open for filling Surge Tank.
2. Low Level
   a) Chilled Water Piping leak or rupture.
   b) Normal system usage.

AUTOMATIC ACTION

NONE

OPERATOR ACTION

1. Determine if level is high or low as indicated by Chiller SRG TK LVL LI-380, on the MCB. ☐

2. IF level is high AND the surge tank is NOT being filled, THEN place the BTRS Mode SEL Switch N1G12HS2102G to the OFF position. ☐

3. IF level is low, THEN;
   A) Notify appropriate personnel to makeup water to the surge tank from the Demineralized Water System (1-BTR-V-7034). ☐
   B) IF level is decreasing rapidly OR can NOT be restored, THEN place the BTRS Mode SEL Switch N1G12HS2102G to the OFF position. ☐

4. Refer to FNP-1-SOP-3.0, BORON THERMAL REGENERATION SYSTEM. ☐

5. Notify appropriate personnel to locate and correct the cause of the alarm. ☐

6. Return the Boron Thermal Regeneration System to normal. ☐

References: A-177100, Sh. 213; D-175040; D-177176; PLS Document; U-176028; U-260610

LOCATION DG4

G4	1A BAT LVL LO-LO

SETPOINT: 65% Level

ORIGIN: 1. Level Bistable LB-106C from Level Transmitter (N1E21LT106)
2. Level Bistable LB-161C from Level Transmitter (N1E21LT161)

NOTE:
- **The minimum required borated water volume for Modes 1 through 4 is ≥ 57% (TRS 13.1.7.4; 11,336 gallons in the BAT).** ☐
- **The minimum required borated water volume for Modes 5 and 6 is ≥ 8% (TRS 13.1.6.6; 2,000 gallons in the BAT).** ☐

PROBABLE CAUSE

1. 1A Boric Acid Tank Low-Low level due to Boration of the Reactor Coolant System.
2. Boric Acid System Tank or Piping rupture.

AUTOMATIC ACTION

NONE

OPERATOR ACTION

1. Determine actual tank level as indicated by 1A Boric Acid TK LVL LI-106 and LI-161, on the MCB. ☐
2. IF alarm is due to Reactor Coolant System boration, THEN shift Boric Acid Transfer Pump suction to 1B Boric Acid Tank when the desired level is reached in accordance with FNP-1-SOP-2.6, CVCS BORIC ACID SYSTEM. ☐
3. IF a system rupture is indicated, THEN notify plant personnel to locate and isolate the leaking pipe or component. ☐
4. Refill 1A Boric Acid Tank, in accordance with FNP-1-SOP-2.6, CVCS BORIC ACID SYSTEM, as soon as possible. ☐
5. Refer to TRM, TR 13.1, for LCO Requirements. ☐

References: A-177100, Sh. 214; D-175039, Sh. 3; PLS Document; Technical Specifications; TRM; U-175987; U-176003; U-260610

LOCATION DG5

SETPOINT: 65% Level

G5	1B BAT LVL LO-LO

ORIGIN: 1. Level Bistable LB-108C from Level Transmitter (N1E21LT108)
2. Level Bistable LB-163C from Level Transmitter (N1E21LT163)

NOTE:
- **The minimum required borated water volume for Modes 1 through 4 is ≥ 57% (TRS 3.1.7.4; 11,336 gallons in the BAT).** ☐
- **The minimum required borated water volume for Modes 5 and 6 is ≥ 8% (TRS 13.1.6.6; 2,000 gallons in the BAT).** ☐

PROBABLE CAUSE

1. 1B Boric Acid Tank Low-Low level due to Boration of the Reactor Coolant System.
2. Boric Acid System Tank or Piping Rupture.

AUTOMATIC ACTION

NONE

OPERATOR ACTION

1. Determine actual tank level as indicated by 1B Boric Acid TK LVL LI-108 and LI-163, on the MCB ☐
2. IF alarm is due to Reactor Coolant System boration, THEN shift Boric Acid Transfer Pump suction to 1A Boric Acid Tank when the desired level is reached in accordance with FNP-1-SOP-2.6, CVCS BORIC ACID SYSTEM. ☐
3. IF a system rupture is indicated, THEN notify plant personnel to locate and isolate the leaking pipe or component. ☐
4. Refill 1B Boric Acid Tank, in accordance with FNP-1-SOP-2.6, CVCS BORIC ACID SYSTEM, as soon as possible. ☐
5. Refer to TRM, TR 13.1, for LCO Requirements. ☐

References: A-177100, Sh. 215; D-175039, Sh. 3; PLS Document; Technical Specifications; TRM; U-175988; U-176004; U-260610

LOCATION DH2

H2	CHLR
	COMPR
	TRBL

SETPOINT:
1. Motor Temperature: Factory Set
2. Low Oil Temperature: 130°F
3. High Oil Temperature: 140°F
4. Low Suction Pressure: 26 PSIG
5. High Discharge Pressure: 150 PSIG
6. Oil Pressure differential: 50 PSID
7. High Discharge Temperature: 230°F

ORIGIN: Auxiliary Relay X, located in Chiller Compressor Starter Cabinet 1A or 1B

PROBABLE CAUSE

1. Lube Oil Heater not energized when Chiller Unit is off.
2. Low cooling water flow
3. Non-condensables in the line or dirty condenser tubes.
4. Low system loading.
5. Lube Oil Strainer plugged.

AUTOMATIC ACTION

1. 1A or 1B Chiller Compressor will stop and remain off until the reset is pushed.

OPERATOR ACTION

NOTE: BTRS Chiller Compressors are no longer used. ☐

1. Notify appropriate personnel to investigate and correct the cause of the alarm. ☐

References: A-177100, Sh. 217; D-175040; U-213686; D-177230; D-177233; D-177234; U-167985; U-167986; U-209129; U-209130

LOCATION DH3

SETPOINT: Not Applicable

H3	CHLR PKG IN LOCAL CONT

ORIGIN: Auxiliary Relay CSSX, located in Chiller Panel 1A or 1B

PROBABLE CAUSE

1. The Selector Switch for 1A or 1B BTRS Chiller Package in the Local position.

AUTOMATIC ACTION

NONE

OPERATOR ACTION

1. No action is necessary if alarm is due to preplanned operational or maintenance activities; otherwise send appropriate personnel to determine the cause of the alarm. ☐
2. Return the Chiller Package to Remote Control as soon as possible. ☐

References: A-177100, Sh. 218; D-175040; U-213686; D-177230; D-177234

LOCATION DH4

H4	1A BAT LVL HI-LO

SETPOINT: 1. High: 94% Level
2. Low: 74% Level

ORIGIN: 1. Level Bistable LB-106A or LB-161A from Level Transmitters (N1E21LT106 and N1E21LT161)
2. Level Bistables LB-106B or LB-161B from Level Transmitters (N1E21LT106 and N1E21LT161)

PROBABLE CAUSE

1. High Level
   a) Normal filling from the Recycle Evaporator or Batching Tank.
2. Low Level
   a) Boration of the Reactor Coolant System.
   b) Boric Acid System Tank or Piping rupture.

AUTOMATIC ACTION

NONE

OPERATOR ACTION

1. Determine if level is high or low as indicated by 1A Boric ACID TK LVL LI-106 and LI-161, on the MCB. ☐

2. IF level is high, THEN stop filling the tank. ☐

3. IF level is low, THEN;
   a) Determine the cause of the alarm. ☐
   b) IF a system rupture is indicated, THEN notify appropriate personnel to locate and isolate the leaking pipe or component. ☐

4. Refill 1A Boric Acid Tank, in accordance with FNP-1-SOP-2.6, CVCS BORIC ACID SYSTEM, as soon as possible. ☐

5. Refer to TRM, TR 13.1, for LCO Requirements. ☐

References: A-177100, Sh. 219; D-175039, Sh. 3; PLS Document; Technical Specifications; TRM; U-175987; U-176003; U-260610

LOCATION DH5

H5	1B BAT LVL HI-LO

SETPOINT: 1. High: 94% Level
2. Low: 74% Level

ORIGIN: 1. Level Bistable LB-108A or LB-163A from Level Transmitters (N1E21LT108 and N1E21LT163)
2. Level Bistables LB-108B or LB-163B from Level Transmitters (N1E21LT108 and N1E21LT163)

PROBABLE CAUSE

1. High Level
   a) Normal filling from the Recycle Evaporator or Batching Tank.
2. Low Level
   a) Boration of the Reactor Coolant System.
   b) Boric Acid System Tank or Piping rupture.

AUTOMATIC ACTION

NONE

OPERATOR ACTION

1. Determine if level is high or low as indicated by 1B Boric Acid TK LVL LI-108 and LI-163, on the MCB. ☐

2. IF level is high, THEN stop filling the tank. ☐

3. IF level is low, THEN;
   a) Determine the cause of the alarm. ☐
   b) IF a system rupture is indicated, THEN notify appropriate personnel to locate and isolate the leaking pipe or component. ☐

4. Refill 1B Boric Acid Tank, in accordance with FNP-1-SOP-2.6, CVCS BORIC ACID SYSTEM, as soon as possible. ☐

5. Refer to TRM, TR 13.1, for LCO Requirements. ☐

References: A-177100, Sh. 220; D-175039, Sh. 3; PLS Document; Technical Specifications; TRM; U-175988; U-176004; U-260610

LOCATION DJ2

SETPOINT: 1. High: 120°F
2. Low: 70°F

ORIGIN: Temperature Switch (N1E21TIS100)

J2
BABT TEMP HI-LO

PROBABLE CAUSE

1. Malfunction of STM TO BABT N1E21TCV100, IF in service.
2. Loss of Steam Supply.

AUTOMATIC ACTION

NONE

OPERATOR ACTION

1. Determine if batching tank temperature is high or low as indicated by TIS-100, locally at the tank. ☐

2. IF temperature is high, THEN verify closed STM to BABT N1E21TCV100. ☐

3. IF temperature is low AND it is desired to align steam to the BABT, THEN;
   a) Verify that Auxiliary Steam is available for heating batching tank. ☐
   b) Open STM to BABT N1E21TCV100. ☐

4. IF temperature is low AND steam is not available to the BABT, THEN;
   a) IF the BABT temperature ≥65°F as indicated by TIS-100, locally at the tank, THEN BABT may be transferred to BAT on recirc. ☐
   b) Check the temperature of the BAT on recirc >70°F for continued batching operations. ☐
   c) IF BABT temperature < 65°F, AND BAT on recirc > 70°F, THEN the contents of the BABT may be transferred to the BAT on recirc. ☐
   d) For each subsequent BABT addition to the on recirc BAT, items 4a), 4b) and 4c) must be performed to ensure the BAT temperature does not go less than 65°F due to batching evolutions. ☐

5. Refer to FNP-1-SOP-2.6, CHEMICAL AND VOLUME CONTROL SYSTEM BORIC ACID SYSTEM. ☐

LOCATION DJ2

OPERATOR ACTION CONT'D

6. Verify Boric Acid Batching Tank Condensate Return Unit is functioning properly. ☐

7. IF steam aligned to the BABT, THEN Batching Tank Temperature can be maintained manually by closely monitoring tank temperature and opening or closing STM TO BABT N1E21TCV100. ☐

8. IF the alarm is due to a system malfunction, THEN notify appropriate personnel to determine and correct the cause of the alarm as soon as possible. ☐

References: A-177100, Sh. 222; D-175039, Sh. 3; D-175006; D-177869; PLS Document

LOCATION DJ3

SETPOINT: Not Applicable

J3	1A OR 1B BA XFER PUMP IN LOCAL CONT

ORIGIN: 1. Selector Switch (Q1E21HS360lAA-A)
2. Selector Switch (Q1E21HS360lBB-B)

PROBABLE CAUSE

1. The Selector Switch for 1A or 1B Boric Acid Transfer Pump located on Hot Shutdown Panel or Selector Switch Box, in the Local position.

AUTOMATIC ACTION

NONE

OPERATOR ACTION

1. No action is necessary if alarm is due to preplanned operational or maintenance activities; otherwise send appropriate personnel to determine the cause of the alarm. ☐

2. Return Boric Acid Transfer Pump control to Remote as soon as possible. ☐

References: A-177100, Sh. 223; D-177224, Sh. 1 & 2

LOCATION DJ4

SETPOINT: 70°F

J4	1A BAT TEMP LO

ORIGIN: Temperature Switch (N1E21TIS107-N)

PROBABLE CAUSE

1. Auxiliary Building temperature is less than 70°F.

AUTOMATIC ACTION

NONE

OPERATOR ACTION

NOTE: The TRM minimum tank temperature is 65°F. ☐

1. Determine actual tank temperature as indicated by TIS-107, locally at the tank. ☐
2. IF required, THEN notify appropriate personnel to determine and correct the cause of the alarm. ☐
3. Refer to TRM, TR 13.1, for LCO Requirements. ☐

References: A-177100, Sh. 224; A-181541; D-175039, Sh. 3; U-260331; PLS Document; Technical Specifications; TRM

LOCATION DJ5

SETPOINT: 70°F

J5	1B BAT TEMP LO

ORIGIN: Temperature Switch (N1E21TIS109-N)

PROBABLE CAUSE

1. Auxiliary Building temperature is less than 70°F.

AUTOMATIC ACTION

NONE

OPERATOR ACTION

NOTE: The TRM minimum tank temperature is 65°F. ☐

1. Determine actual tank temperature as indicated by TIS-109, locally at the tank. ☐
2. IF required, THEN notify appropriate personnel to determine and correct the cause of the alarm. ☐
3. Refer to TRM, TR 13.1, for LCO Requirements. ☐

References: A-177100, Sh. 225; A-181541; D-175039, Sh. 3; U-260331; PLS Document; Technical Specifications; TRM

LOCATION DK1

SETPOINT: ± 8 GPM

K1	TOTAL RX MKUP FLOW DEV HI-LO

ORIGIN: 1-MUX7 Auxiliary Relay Contact, actuated by Flow Transmitter (N1E21FT168)

PROBABLE CAUSE

1. Total Makeup greater or less than that called for by flow controller after 75 ± 11.25 seconds. Caused by malfunction of RMW TO BLENDER Q1E21FCV114B or 1A and 1B Reactor Makeup Water Pump tripped.

AUTOMATIC ACTION

1. Closes MKUP TO CHG PUMP SUCTION HDR Q1E21FCV113B.
2. Closes MKUP TO VCT Q1E21FCV114A.

OPERATOR ACTION

1. Take manual control of the makeup system in accordance with FNP-1-SOP-2.3, CVCS REACTOR MAKEUP CONTROL SYSTEM, and monitor Volume Control Tank Level. IF the cause of the alarm is known and the makeup system is being controlled by the operator, THEN it is permissible to open MKUP TO VCT Q1E21FCV114A and MKUP TO CHG PUMP SUCTION HDR Q1E21FCV113B by placing their respective hand switches in open as necessary to complete the desired makeup. ☐
2. Determine the cause of the alarm. ☐
3. Notify appropriate personnel to correct the cause of the alarm. ☐
4. Return the Makeup System to Automatic as soon as possible. ☐

References: A-177100, Sh. 226; D-175039, Sh. 2; D-177097; D-177098; D-177509; D-177510; D-177511; U-176206; PLS Document

LOCATION DK2

SETPOINT: ± 2 GPM

K2	BA FLOW DEV HI-LO

ORIGIN: 1-MUX6 Auxiliary Relay Contact, actuated by Flow Transmitter (Q1E21FT113)

PROBABLE CAUSE

1. Boric Acid flow greater or less than that called for by flow controller after 75 ± 11.25 seconds. Caused by malfunction of BORIC ACID TO BLENDER Q1E21FCV113A or 1A or 1B Boric Acid Transfer Pump tripped.

AUTOMATIC ACTION

1. Closes MKUP TO CHG PUMP SUCTION HDR Q1E21FCV113B.
2. Closes MKUP TO VCT Q1E21FCV114A.

OPERATOR ACTION

1. Take manual control of the makeup system in accordance with FNP-1-SOP-2.3, CVCS REACTOR MAKEUP CONTROL SYSTEM, and monitor Volume Control Tank Level OR ☐

2 IF the cause of the alarm is known and the makeup system is being controlled by the operator or in Automatic, THEN it is permissible to open MKUP TO VCT Q1E21FCV114A and MKUP TO CHG PUMP SUCTION HDR Q1E21FCV113B by placing their respective hand switches in open as necessary to complete the desired makeup. ☐

3. Determine the cause of the alarm. ☐

4. Notify appropriate personnel to correct the cause of the alarm. ☐

5. Return the Makeup System to Automatic as soon as possible. ☐

References: A-177100, Sh. 227; D-175039, Sh. 2; D-177097; D-177098; D-177509; D-177510; D-177379; PLS Document; U-176025

LOCATION DK3

SETPOINT: 20% VCT Level

K3	AUTO MKUP START SIGNAL BLOCKED

ORIGIN:
1. 1-LY-115CX Auxiliary Relay actuated by Level Transmitter (Q1E21LT115)
2. Selector Switch (N1E21HS2100Q)

PROBABLE CAUSE

1. MKUP MODE SEL SWITCH not in AUTO position and Volume Control Tank level less than 20%.

AUTOMATIC ACTION

NONE

OPERATOR ACTION

1. Makeup to the Reactor Coolant System in accordance with FNP-1-SOP-2.3, CVCS REACTOR MAKEUP CONTROL SYSTEM. ☐

References: A-177100, Sh. 228; D-175039, Sh. 2; D-177097; D-177303; PLS Document

LOCATION DK4

SETPOINT: 125°F

K4	1A BAT TEMP HI

ORIGIN: Temperature Switch (N1E21TIS107-N)

PROBABLE CAUSE

1. High Temperature of Boric Acid added to tank during filling.

AUTOMATIC ACTION

NONE

OPERATOR ACTION

1. Determine actual tank temperature as indicated by TIS-107, locally at the tank. ☐
2. Refer to FNP-1-SOP-2.6, CHEMICAL AND VOLUME CONTROL SYSTEM, BORIC ACID SYSTEM. ☐
3. IF required, THEN notify appropriate personnel to determine and correct the cause of the alarm. ☐

References: A-177100, Sh. 229; A-181541; D-175039, Sh. 3; U-260331; PLS Document

LOCATION DK5

SETPOINT: 125°F

K5	1B BAT TEMP HI

ORIGIN: Temperature Switch (N1E21TIS109-N)

PROBABLE CAUSE

1. High Temperature of Boric Acid added to tank during filling.

AUTOMATIC ACTION

NONE

OPERATOR ACTION

1. Determine actual tank temperature as indicated by TIS-109, locally at the tank. ☐
2. Refer to FNP-1-SOP-2.6, CHEMICAL AND VOLUME CONTROL SYSTEM, BORIC ACID SYSTEM. ☐
3. IF required, THEN notify appropriate personnel to determine and correct the cause of the alarm. ☐

References: A-177100, Sh. 230; A-181541; D-175039, Sh. 3; U-260331; PLS Document

FARLEY NUCLEAR PLANT

ANNUNCIATOR RESPONSE PROCEDURE

FNP-1-ARP-1.8

SAFETY RELATED

MAIN CONTROL BOARD ANNUNCIATOR PANEL H

PROCEDURE LEVEL OF USE CLASSIFICATION PER NMP-AP-003	
CATEGORY	**SECTIONS**
Continuous:	**ALL**
Reference:	**NONE**
Information:	**NONE**

Approved: David L Reed Effective Date: 05/21/2015
Operations

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VERSION SUMMARY
Version 36.0 DESCRIPTION
CR 10064507 - HH5, modified step 2 to check RCDT parameters for increasing trends

Records

No records are generated from this procedure

MAIN CONTROL BOARD ANNUNCIATOR PANEL H

A1 PRZR LVL HI RX TRIP ALERT	B1 PRZR LVL HI	C1 PRZR PRESS HI-LO	D1 PRZR PRESS REL VLV 445A OR B/U HTRS ON	E1 REL VLV 444B/445A OPEN
A2 PRZR LVL DEV HI B/U HTRS ON	B2 PRZR LVL DEV LO	C2 PRZR HI-LO PRESS ALERT	D2 PRZR PRESS SI PORV BLOCK P-11	E2 SAFETY VLV 8010A/B/C OPEN
A3 PRZR LVL LO HTRS OFF LTDN SEC		C3 PRZR PRESS LO SI ALERT	D3 PRZR CONT PRESS OUTPUT HI	E3 PRT TEMP HI
A4 PRZR SAFETY VLV TEMP HI	B4 PRZR SPRAY LINE LOOP 1A/1B TEMP LO	C4 PRZR HTRS IN LOCAL CONT	D4 PRZR HTR CONT TRBL	E4 PRT LVL HI-LO
A5 PRZR PORV TEMP HI	B5 PRZR SRG LINE TEMP LO	C5 PRZR VAP OR LIQ TEMP HI	D5 PRZR HTR BKR TRIPPED	E5 PRT PRESS HI

MAIN CONTROL BOARD ANNUNCIATOR PANEL H

F1 RX COOLANT LOOPS TAVG DEV HI-LO	G1 RCP 1A BRG UPPER/LOWER OIL RES HI LVL	H1 RCP 1A BRG UPPER/LOWER OIL RES LO LVL
F2 RX COOLANT LOOPS ΔT DEV HI-LO	G2 RCP 1B BRG UPPER/LOWER OIL RES HI LVL	H2 RCP 1B BRG UPPER/LOWER OIL RES LO LVL
F3 TAVG/TREF DEV	G3 RCP 1C BRG UPPER/LOWER OIL RES HI LVL	H3 RCP 1C BRG UPPER/LOWER OIL RES LO LVL
F4 RX COOLANT LOOPS 1A, 1B OR 1C TAVG LO-LO	G4 OMS REL VLV PATH CLOSED AT LO TEMP	H4 RCP VIB TRBL
F5 RX COOLANT LOOPS TAVG HI	G5 SOLID RCS PRESS HI	H5 RX VESSEL FLANGE LKOF TEMP HI

LOCATION HA1

SETPOINT: 92% of Span

ORIGIN: Pressurizer High Water Level Bistables from PRZR Level Transmitters LT-459, LT-460 or LT-461 1/3 Detectors

A1
PRZR LVL HI RX TRIP ALERT

PROBABLE CAUSE

1. Pressurizer Level Instrument or Control System malfunction.
2. Charging or Letdown System malfunction.
3. Void formation in the Reactor Coolant System.

AUTOMATIC ACTION

NONE

OPERATOR ACTION

1. Determine actual pressurizer water level as indicated by LI-459, LI-460 AND LI-461, on the MCB. ☐
2. IF an instrument failure has occurred, THEN go to FNP-1-AOP-100, INSTRUMENT MALFUNCTION. ☐
3. IF a charging OR letdown system malfunction exists, THEN go to FNP-1-AOP-16.0 CVCS MALFUNCTION. ☐
4. Refer to Technical Specifications section on Instrumentation for LCO Requirements. ☐

References: A-177100, Sh. 356; U-260610; U-198768; U-266647 PLS Document; Technical Specifications

LOCATION HA2

SETPOINT: 5% of Span above Level Program

ORIGIN: Level Bistable LB-459D from Level Transmitter LT-459 or LT-461 and TY-408 median TAVG.

A2
PRZR LVL DEV HI B/U HTRS ON

PROBABLE CAUSE

1. Pressurizer Level Instrument or Control System malfunction.
2. Plant Transient while in manual rod control.
3. Rod Control System malfunction.
4. Charging or Letdown System malfunction.

AUTOMATIC ACTION

1. Pressurizer Backup Heaters energize.

OPERATOR ACTION

1. Place turbine load on HOLD. ☐
2. Check pressurizer level indications and determine the actual level deviation. ☐
3. IF an instrument failure has occurred, THEN go to FNP-1-AOP-100, INSTRUMENT MALFUNCTION. ☐
4. Ensure that the pressurizer backup heaters are energized. ☐
5. IF required, THEN take manual control of CHG FLOW FK 122 and decrease charging flow to return pressurizer level to the program band. ☐
6. Determine the cause of the level deviation by checking:
   - 5.1 Charging flow ☐
   - 5.2 Letdown flow ☐
   - 5.3 BTRS flow ☐
   - 5.4 Charging pump status ☐
7. IF the alarm was caused by a plant transient, THEN control the transient and return Pressurizer Level to normal. ☐
8. IF a charging OR letdown system malfunction exists, THEN go to FNP-1-AOP-16.0, CVCS MALFUNCTION. ☐

References: A-177100, Sh. 357; U-260610; D-177109; D-177111; D-177112; D-177113; U-266647 PLS Document; Technical Specifications

LOCATION HA3

SETPOINT: 15% of Level Span

ORIGIN: Level Bistable LB-459C or LB-460C from Level Transmitters LT-459 and LT-460 respectively (or LT-461 when selected in place of LT-459 or LT-460).

A3
PRZR LVL LO HTRS OFF LTDN SEC

PROBABLE CAUSE

1. Pressurizer Level Instrument or Control System malfunction.
2. Charging System malfunction.
3. Primary Coolant leak.
4. Plant Transient.

AUTOMATIC ACTION

1. Pressurizer backup AND proportional heaters de-energized.
2. LB459C closes LTDN LINE ISO Q1E21LCV459 and LB460C closes LTDN LINE ISO Q1E21LCV460.
3. LTDN ORIF ISO VALVES Q1E21HV8149A, B & C close.

OPERATOR ACTION

1. Check indications and determine actual pressurizer level and pressure. ☐
2. Ensure that the automatic actions have occurred. ☐
3. IF an instrument failure has occurred, THEN go to FNP-1-AOP-100, INSTRUMENT MALFUNCTION. ☐
4. IF actual level is low, THEN take actions as necessary to increase charging flow and maintain pressurizer level. ☐
5. IF a primary coolant leak is indicated, THEN perform the actions required by the appropriate AOP or EEP. ☐
   a) FNP-1-AOP-1.0, RCS LEAKAGE.
   b) FNP-1-EEP-0, REACTOR TRIP OR SAFETY INJECTION
   c) FNP-1-AOP-2.0, STEAM GENERATOR TUBE LEAKAGE
6. IF a charging OR letdown system malfunction exists, THEN go to FNP-1-AOP-16.0, CVCS MALFUNCTION. ☐

References: A-177100, Sh. 358; U-260610; D-177179; D-177376; D-177377; D-177378; D-177585; D-177586; U-266647 PLS Document; Technical Specifications

LOCATION HA4

A4
PRZR SAFETY VLV TEMP HI

SETPOINT: Ambient + 20°F

ORIGIN:
1. Temp. Bistable TB-465 from Temp. Element TE-465 monitoring valve Q1B13V031C.
2. Temp. Bistable TB-467 from Temp. Element TE-467 monitoring valve Q1B13V031B.
3. Temp. Bistable TB-469 from Temp. Element TE-469 monitoring valve Q1B13V031A.

PROBABLE CAUSE

NOTE: This annunciator has REFLASH capability. ☐

1. A Pressurizer Safety Valve has lifted or is leaking.
2. Instrument failure.

AUTOMATIC ACTION

NONE

OPERATOR ACTION

1. Determine which valve has lifted or is leaking, by utilizing TI-465, TI-467 and TI-469, located on the MCB. ☐
2. Monitor pressurizer pressure and level and pressurizer relief tank pressure, level and temperature. ☐
3. IF a safety valve has lifted due to high system pressure, THEN verify that the safety valve re-seats when system pressure has been reduced. ☐
4. IF a safety valve has lifted due to an instrument failure, THEN refer to annunciator HC1, PRZR PRESS HI-LO. ☐
5. IF a safety valve has lifted and reseats, and subsequently lifts and reseats at approximately the same RCS pressure, THEN maintain RCS pressure less than lift pressure AND comply with Tech Specs 3.4.1 and 2.1.1 limits. ☐
6. IF a Safety Valve is leaking OR does NOT re-seat, THEN:
   a) Perform the actions required by FNP-1-AOP-1.0, RCS LEAKAGE. ☐
   b) Refer to the Technical Specifications and TRM for LCO Requirements related to RCS leakage and safety valve operation. ☐
7. IF the alarm was due to an instrument fault, THEN notify appropriate personnel to determine the cause and correct the fault. ☐
8. Refer to FNP-0-SOP-0, GENERAL INSTRUCTIONS TO OPERATIONS PERSONNEL, for reporting requirements. ☐

References: A-177100, Sh. 359; D-175037, Sh. 2; U-266647 PLS Document; Technical Specifications, Technical Requirements Manual

LOCATION HA5

SETPOINT: Ambient + 20°F

ORIGIN: Temp. Bistable TB-463 from Temp. Element TE-463

A5
PRZR PORV TEMP HI

PROBABLE CAUSE

1. One or both PRZR PORVs Q1B31PCV444B and Q1B31PCV445A has lifted or is leaking.
2. Instrument failure.

AUTOMATIC ACTION

NONE

OPERATOR ACTION

1. Verify an actual temperature alarm by utilizing TI-463 and comparing the indication to containment ambient temperature. ☐
2. Monitor pressurizer pressure and level and pressurizer relief tank pressure, level and temperature. ☐
3. IF a relief valve has lifted due to high system pressure, THEN ensure that the relief valve closes when system pressure has been reduced. ☐
4. IF a relief valve has lifted due to an instrument failure AND actual PRZR pressure is low, THEN close the affected valve in manual and refer to annunciator window HC1, PRZR PRESS HI-LO. ☐

NOTE: Technical Specification 3.4.11 addresses operation with a PRZR PORV ISO valve closed. ☐

5 IF the alarm is determined to be caused by relief valve leakage, THEN isolate both relief valves by closing both PRZR PORV ISOs Q1B31MOV8000A & B and determine the leaking valve as follows:

a) Allow relief line temperature to decrease sufficiently that temperature changes can be observed. ☐
b) Open PRZR PORV ISO Q1B31MOV8000A and monitor the relief line temperature. ☐
c) IF temperature does NOT increase, THEN no further action is necessary. ☐
d) IF a temperature rise is observed, THEN close PRZR PORV ISO Q1B31MOV8000A and open PRZR PORV ISO Q1B31MOV8000B. ☐
e) Verify that the relief line temperature decreases to ambient ☐

OPERATOR ACTION (Cont.)

6. IF the alarm was due to an instrument fault, THEN notify appropriate personnel to determine the cause and correct the fault. ☐
7. Refer to FNP-0-SOP-0, GENERAL INSTRUCTIONS TO OPERATIONS PERSONNEL, for reporting requirements. ☐

References: A-177100, Sh. 360; D-175037, Sh. 2; U-266647 PLS Document

LOCATION HB1

SETPOINT: 70% of Level Span

ORIGIN: Level Bistable LB-460C from Level Transmitter LT-460 or LT-461

B1
PRZR LVL HI

PROBABLE CAUSE

1. Pressurizer Level Instrument or Control System malfunction.
2. Charging or Letdown System malfunction.
3. Void formation in the Reactor Coolant System.

AUTOMATIC ACTION

NONE

OPERATOR ACTION

1. Determine actual pressurizer water level as indicated by LI-459, LI-460 AND LI-461, on the MCB. ☐
2. IF an instrument failure has occurred, THEN go to FNP-1-AOP-100, INSTRUMENT MALFUNCTION ☐
3. IF a charging OR letdown system malfunction exists, THEN go to FNP-1-AOP-16.0, CVCS MALFUNCTION ☐
4. Refer to Technical Specifications 3.3.1 and 3.4.9 for LCO requirements. ☐

References: A-177100, Sh. 361; U-260610; U-266647 PLS Document

LOCATION HB2

SETPOINT: 5% of span below Level Program

ORIGIN: Level Bistable LB-459E from ΔLevel between Transmitter LT-459 (or LT-461 when selected in place of LT-459) and TY459 level program (derived from TY-408 median TAVG)

B2
PRZR LVL DEV LO

PROBABLE CAUSE

1. Pressurizer Level Instrument or Control System malfunction.
2. Plant Transient.
3. Rod Control System malfunction.
4. Charging or Letdown System malfunction.
5. RCS leakage.

AUTOMATIC ACTION

NONE

OPERATOR ACTION

1. Place turbine on HOLD. ☐
2. Check pressurizer level indications and determine the actual level deviation.
3. IF an instrument failure has occurred, THEN go to FNP-1-AOP-100, INSTRUMENT MALFUNCTION ☐
4. IF required, THEN take manual control of CHG FLOW FK 122 and increase charging flow to return pressurizer level to the program band. ☐
5. Determine the cause of the level deviation by checking: Charging Flow; Letdown Flow, and if applicable BTRS Flow. ☐
6. IF the alarm was caused by a plant transient, THEN control the transient and return Pressurizer level to normal. ☐
7. IF a charging OR letdown system malfunction exists, THEN go to FNP-1-AOP-16.0, CVCS MALFUNCTION ☐
8. Maintain pressurizer level at the program level until the affected component(s) can be restored to normal operation. ☐
9. IF a primary coolant leak OR rupture is indicated, THEN perform the actions of the appropriate AOP or EEP. ☐
   a) FNP-1-AOP-1.0, RCS LEAKAGE.
   b) FNP-1-EEP-0, REACTOR TRIP OR SAFETY INJECTION
   c) FNP-1-AOP-2.0, STEAM GENERATOR TUBE LEAKAGE

References: A-177100, Sh. 362; U-260610; U-266647 PLS Document; Technical Specifications; West 7300 Dwgs 7378D53, 7378D71, 7378D66

LOCATION HB4

B4
PRZR SPRAY LINE LOOP 1A/1B TEMP LO

SETPOINT: 500°F

ORIGIN: 1. Loop 1A: Temp Bistable TB-451 from TE-451
2. Loop 1B: Temp Bistable TB-452 from TE-452

PROBABLE CAUSE

NOTE: This annunciator has REFLASH capability. ☐

1. Insufficient Spray Flow.
2. Loop 1A or 1B idle.
3. Instrument malfunction.
4. Normal cooldown / depressurization.

AUTOMATIC ACTION

NONE

OPERATOR ACTION

1. Determine the actual spray line temperature and to which spray loop the alarm is attributed as indicated by TI-451 and TI-452, on the MCB. ☐
2. Monitor pressurizer vapor temperature (TI-454 on MCB), spray line temperatures and cold leg reactor coolant temperatures. ☐
3. IF the alarm is due to Loop 1A OR 1B being idle, THEN ensure that the spray valve for the affected loop is closed to preclude backflow from the operating loop which would deplete the total spray flow to the pressurizer. ☐

CAUTION: Spray Flow should not be initiated if the temperature difference between the Pressurizer and the spray fluid is greater than 320°F. ☐

4. Energize sufficient pressurizer backup heaters to initiate spray flow to maintain spray line temperature. ☐
5. IF the alarm is due to insufficient spray flow, THEN determine and correct the cause for the decreased flowrate. ☐
6. Refer to TRM 13.4.2 for LCO requirements. ☐

References: A-177100, Sh. 364; U-260610; D-175037, Sh. 2; U-266647 PLS Doc; Technical Requirements Manual

LOCATION HB5

SETPOINT: 500°F

ORIGIN: Temp. Bistable TB-450 from Temp. Element TE-450

B5
PRZR SRG LINE TEMP LO

PROBABLE CAUSE

1. Insufficient Spray Flow.
2. Loop 1A or 1B idle.
3. Instrument malfunction.
4. Normal cooldown / depressurization.

AUTOMATIC ACTION

NONE

OPERATOR ACTION

1. Determine the actual surge line temperature as indicated by TI-450, on the MCB. ☐
2. Monitor pressurizer vapor temperature, surge line temperatures and cold leg reactor coolant temperatures. ☐
3. IF the alarm is due to Loop 1A OR 1B being idle, THEN ensure that the spray valve for the affected loop is closed to preclude backflow from the operating loop into the idle loop which would deplete the total spray flow to the pressurizer. ☐

CAUTION: Spray Flow should not be initiated if the temperature difference between the Pressurizer and the spray fluid is greater than 320°F. ☐

4. Energize sufficient pressurizer backup heaters to initiate spray flow to maintain spray line temperature. ☐
5. IF the alarm is due to insufficient spray flow, THEN determine and correct the cause for the decreased flowrate. ☐
6. Refer to TRM 13.4.2 for LCO requirements. ☐

References: A-177100, Sh. 365; U-260610; D-175037, Sh. 2; U-266647 PLS Document; Technical Requirements Manual

LOCATION HC1

C1

PRZR PRESS
HI-LO

SETPOINT:
1. High Pressure: 2310 PSIG
2. Low Pressure: 2185 PSIG

ORIGIN:
1. Pressure Bistable PB-445C (high) from Pressure Transmitter PT-445.
2. Pressure Bistable PB-445B (low) from Pressure Transmitter PT-445.

PROBABLE CAUSE

1. High Pressure
   a) Malfunction of Pressurizer Heaters and/or Spray Valves.
   b) Plant Transient
   c) Rod Control System malfunction
2. Low Pressure
   a) Primary Coolant leakage or rupture
   b) Malfunction of Pressurizer Heaters and/or Spray Valves.
   c) Power Operated Relief Valve leakage or malfunction.
   d) Plant Transient
   e) Rod Control System malfunction
   f) Uncontrolled or excessive cooldown
   g) Normal cooldown / depressurization
3. Instrument failure

AUTOMATIC ACTION

NONE

OPERATOR ACTION

1. Check pressurizer pressure indications and determine if pressure is high or low. ☐
2. Check the status of the following and take manual control as necessary: ☐
   2.1 Pressurizer spray valves.
   2.2 Pressurizer power operated relief valves (PORVs).
   2.3 Pressurizer heaters.
3. IF an instrument failure has occurred, THEN go to FNP-1-AOP-100, INSTRUMENT MALFUNCTION. ☐

OPERATOR ACTION (cont.)

NOTE: • **WHEN transitioning to FNP-1-EEP-0.0 AND at the Shift Supervisors direction, it is ACCEPTABLE for one team member to complete the Immediate Operator Actions of FNP-1-EEP-0.0. While the other team member verifies a Reactor Trip, THEN trips the appropriate RCP(s) before finishing the Immediate Operator Actions of FNP-1-EEP-0.0. (AI 2004200019)** ☐

• **Westinghouse analysis and industry experience has shown that a failed open spray valve will require stopping two RCPs to stop spray flow.** ☐

4. IF pressurizer pressure is decreasing due to a mechanically stuck open spray valve PCV-444 C(D), THEN perform the following.

   4.1 Trip the reactor prior to pressure reaching 2100 PSIG, AND go to FNP-1-EEP-0.0, REACTOR TRIP OR SAFETY INJECTION. (AI-2004200019) ☐

   4.2 Verify 1A and 1B RCPs secured. ☐

5. IF pressurizer pressure is decreasing due to a stuck open PORV, THEN close the associated PORV block valve. ☐

6. Maintain reactor coolant system pressure at 2235 psig with the affected component(s) in manual control until automatic operation can be restored. ☐

7. IF a Power Operated Relief Valve is leaking OR is malfunctioning, THEN isolate the affected relief valve and refer to Tech. Spec. 3.4.11 for LCO requirements. ☐

8. IF the pressurizer power operated relief valves operated, THEN:
   a) Refer to FNP-1-SOP-1.2, REACTOR COOLANT PRESSURE RELIEF SYSTEM, for cooldown of the pressurizer relief tank. ☐
   b) Refer to FNP-0-SOP-0, GENERAL INSTRUCTIONS TO OPERATIONS PERSONNEL, for reporting requirements. ☐

9. IF the alarm was caused by a plant transient, THEN control the transient and return pressurizer pressure to normal. ☐

10. IF a rod control system malfunction exists, THEN take MANUAL rod control in accordance with FNP-1-AOP-19.0, MALFUNCTION OF ROD CONTROL SYSTEM. ☐

LOCATION HC1

OPERATOR ACTION (cont.)

11. IF plant is in MODES 3, 4 or 5 AND pressurizer spray valve PCV-444C (D) fails open and cannot be closed, THEN verify 1A AND 1B RCPs secured. ☐

12. IF a primary coolant leak OR rupture is indicated, THEN perform the actions of the appropriate AOP or EEP. ☐
    a) FNP-1-EEP-0, REACTOR TRIP OR SAFETY INJECTION
    b) FNP-1-AOP-1.0, RCS LEAKAGE
    c) FNP-1-AOP-2.0, STEAM GENERATOR TUBE LEAKAGE

13. Refer to Technical Specification 3.4.11 for LCO Requirements ☐

References: A-177100, Sh. 366; U-260610; D-175037, Sh. 2; U-266647 PLS Document; Westinghouse Dwg 7378D44; Technical Specifications

LOCATION HC2

C2
PRZR HI-LO PRESS ALERT

SETPOINT: 1. High Pressure: 2385 PSIG
2. Low Pressure: 1865 PSIG
a) Time Constant: Lead 10 seconds
Lag 1 second

ORIGIN: 1. High Pressure Bistables
PT-455, PT-456 and PT-457. 1/3 coincidence
2. Low Pressure Rate Compensated Bistables from
PT-455, PT-456 and PT-457
1/3 coincidence

PROBABLE CAUSE

1. High Pressure
   a) Pressurizer Pressure Control System malfunction.
   b) High Pressure from a rapid decrease in turbine power.
2. Low Pressure
   a) Primary Coolant leakage or rupture.
   b) Pressurizer Spray or Relief Valve failed open.
   c) Pressurizer Heater or Pressure Control System malfunction.
   d) Normal cooldown / depressurization.
3. Instrument failure or in test.

AUTOMATIC ACTION

NONE

OPERATOR ACTION

1. Check pressurizer pressure indications and determine if pressure is high or low. ☐
2. IF an instrument failure has occurred, THEN go to FNP-1-AOP-100, INSTRUMENT MALFUNCTION. ☐
3. Monitor pressurizer pressure, level and pressure control system parameters. ☐
4. IF actual pressure is ≤ 1865 PSIG or ≥ 2385 PSIG, THEN verify reactor trip and go to FNP-1-EEP-0, REACTOR TRIP OR SAFETY INJECTION. ☐
5. IF either the pressurizer heaters, spray valves OR power operated relief valves are malfunctioning, THEN take manual control of the affected component. Refer to annunciator window HC1, PRZR PRESS HI-LO. ☐
6. IF a PORV is leaking OR has failed to close, THEN isolate the affected relief valve. ☐
7. IF a Power Operated Relief Valve has opened, THEN refer to FNP-0-SOP-0.0, INSTRUCTIONS TO OPERATIONS PERSONNEL, for reporting requirements. ☐

References: A-177100, Sh. 367; U-260610; U-198768; U-266647 PLS Document; Technical Specifications; D-175037, Sh. 2.

LOCATION HC3

SETPOINT: 1850 PSIG

C3
PRZR PRESS LO SI ALERT

ORIGIN: Pressure Bistables PB-455D, PB-456D and PB-457D
Pressure Transmitters PT-455, PT-456, and PT-457
1/3 Detectors

PROBABLE CAUSE

1. Reactor Coolant System leakage or rupture.
2. Pressurizer Spray or Power Operated Relief Valve failed open.
3. Pressure Control System malfunction
4. Instrument failure or in test.
5. Normal cooldown / depressurization.

AUTOMATIC ACTION

NONE

OPERATOR ACTION

1. Check pressurizer pressure indications and determine the actual pressure. ☐
2. IF an instrument failure has occurred, THEN go to FNP-1-AOP-100, INSTRUMENT MALFUNCTION. ☐
3. Check indications of pressurizer level, pressure, spray and relief valves and attempt to determine the cause of the low pressure. ☐
4. IF actual pressure is ≤ 1850 PSIG, THEN verify safety injection and go to FNP-1-EEP-0, REACTOR TRIP OR SAFETY INJECTION. ☐
5. IF a pressurizer pressure control system failure is indicated, THEN take manual control of the affected component. Refer to annunciator window HC1, PRZR PRESS HI-LO. ☐
6. IF a Power Operated Relief Valve is leaking OR has failed to close, THEN isolate the affected relief valve. ☐
7. Refer to the Technical Specifications for LCO requirements. ☐

References: A-177100, Sh. 368; U-260610; U-198768; U-266647 PLS Document; Technical Specifications

LOCATION HC4

SETPOINT: Not Applicable

ORIGIN: 1. Heater Group 1A Selector Switch
2. Heater Group 1B Selector Switch

C4
PRZR HTRS IN LOCAL CONT

PROBABLE CAUSE

1. The Selector Switch for Pressurizer Heaters Group 1A or 1B, located on Hot Shutdown Panel A or C, in the Local position.

AUTOMATIC ACTION

NONE

OPERATOR ACTION

1. No action is necessary if the alarm is due to preplanned operational or maintenance activities; otherwise send appropriate personnel to determine the cause of the alarm.
2. Return the selector switch to the Remote position as soon as possible.

References: A-177100, Sh. 369; D-177109; D-177111

LOCATION HC5

SETPOINT: 666°F

C5
PRZR VAP OR LIQ TEMP HI

ORIGIN: 1. Vapor Temperature: Temperature Bistable TB-454 from Temperature Element TE-454.
2. Liquid Temperature: Temperature Bistable TB-453 from Temperature Element TE-453.

PROBABLE CAUSE

NOTE: This annunciator has REFLASH capability. ☐

1. Pressurizer Pressure Control System malfunction.
2. Instrument failure.

AUTOMATIC ACTION

NONE

OPERATOR ACTION

1. Determine the actual temperature as indicated on TI-453 and TI-454, on the MCB. ☐
2. Monitor pressurizer temperature, pressure and level. ☐

NOTE: For a temperature of 666°F, pressure should be approximately 2445 PSIG. ☐

3. Make a comparison between pressurizer pressure and the highest reading pressurizer temperature instrument and determine if an actual temperature increase is indicated. ☐
4. IF pressure is high, THEN manually initiate pressurizer spray to reduce pressure. ☐
5. Refer to annunciator window HC1, PRZR PRESS HI-LO. ☐
6. IF the alarm was due to an instrument OR component failure, THEN notify appropriate personnel to determine the cause and correct the fault. ☐

References: A-177100, Sh. 370; U-260610; D-175037, Sh. 2; U-266647 PLS Document

LOCATION HD1

D1
PRZR PRESS REL VLV 445A OR B/U HTRS ON

SETPOINT:
1. High Pressure: 2335 PSIG
2. Low Pressure: 70% indicated demand on Master Pressure Controller PC444A (equivalent to a nominal pressure of 2210 PSIG)

ORIGIN:
1. Pressure Bistable PB-445A from Pressure Transmitter PT-445A.
2. Pressure Bistable PB-444F from Pressure Transmitter PT-444 via Master Pressure Controller PC444A.

PROBABLE CAUSE

1. High Pressure
   a) Malfunction of Pressurizer Heaters and/or Spray Valves.
   b) Plant Transient
   c) Rod Control System malfunction
2. Low Pressure
   a) Primary Coolant leakage or rupture
   b) Malfunction of Pressurizer Heaters and/or Spray Valves.
   c) Power Operated Relief Valve leakage or malfunction.
   d) Plant Transient
   e) Rod Control System malfunction
   f) Uncontrolled or excessive cooldown
3. Instrument failure

AUTOMATIC ACTION

1. At 2335 PSIG, PRZR PORV Q1B31PCV445A opens with handswitch in 'AUTO'.
2. At 70% Master Pressure Controller demand (i.e. 30% controller output equivalent to a nominal pressure of 2210 PSIG), Backup Heater groups in 'AUTO' energize.

OPERATOR ACTION

1. Check actual pressurizer pressure indications to determine the cause of the alarm. ☐
2. Check the status of the following and take manual control as necessary:
   2.1 Pressurizer spray valves. ☐
   2.2 Pressurizer power operated relief valves. ☐
   2.3 Pressurizer heaters. ☐
3. IF an instrument failure has occurred, THEN go to FNP-1-AOP-100, INSTRUMENT MALFUNCTION. ☐

OPERATOR ACTION (cont.)

NOTE: • **WHEN transitioning to FNP-1-EEP-0.0 AND at the Shift Supervisors direction, It is ACCEPTABLE for one team member to complete the Immediate Operator Actions of FNP-1-EEP-0.0. While the other team member verifies a Reactor Trip, THEN trips the appropriate RCP(s) before finishing the Immediate Operator Actions of FNP-1-EEP-0.0. (AI 2004200019)** ☐

• **Westinghouse analysis and industry experience has shown that a failed open spray valve will require stopping two RCPs to stop spray flow.** ☐

4. IF pressurizer pressure is decreasing due to a mechanically stuck open spray valve PCV-444 C(D), THEN perform the following:

   4.1 Trip the reactor prior to pressure reaching 2100 PSIG, AND go to FNP-1-EEP-0.0, REACTOR TRIP OR SAFETY INJECTION. (AI-2004200019) ☐

   4.2 Verify 1A and 1B RCPs secured. ☐

5. IF pressurizer pressure is decreasing due to a stuck open PORV, THEN close the associated PORV block valve. ☐

6. Maintain reactor coolant system pressure at 2235 psig with the affected component(s) in manual control until automatic operation can be restored. ☐

7. IF a Power Operated Relief Valve is leaking OR is malfunctioning, THEN isolate the affected relief valve and refer to Tech. Spec. 3.4.11 for LCO requirements. ☐

8. IF the pressurizer power operated relief valves operated, THEN:
   a) Refer to FNP-1-SOP-1.2, REACTOR COOLANT PRESSURE RELIEF SYSTEM, for cooldown of the pressurizer relief tank. ☐
   b) Refer to FNP-0-SOP-0, GENERAL INSTRUCTIONS TO OPERATIONS PERSONNEL, for reporting requirements. ☐

9. IF a Rod Control System malfunction exists, THEN take MANUAL rod control in accordance with FNP-1-AOP-19.0, MALFUNCTION OF ROD CONTROL SYSTEM. ☐

LOCATION HD1

OPERATOR ACTION (cont.)

10. IF plant is in Modes 3, 4 or 5 AND pressurizer spray valve PCV-444C (D) fails open and cannot be closed, THEN verify 1A and 1B RCPs secured. ☐

11. IF a primary coolant leak OR rupture is indicated, THEN perform the actions of the appropriate AOP or EEP. ☐
    a) FNP-1-EEP-0, REACTOR TRIP OR SAFETY INJECTION
    b) FNP-1-AOP-1.0, RCS LEAKAGE
    c) FNP-1-AOP-2.0, STEAM GENERATOR TUBE LEAKAGE

12. IF B/U heaters automatically energized with pressure above 2210 psig, THEN verify the pressurizer master controller potentiometer setting using the plant curve book. ☐

References: A-177100, Sh. 371; U-260610; D-177109; D-177111; D-177112; D-177113; D-177381; Technical Specifications.

LOCATION HD2

SETPOINT: 1. 2000 PSIG

ORIGIN: 1. Pressure Bistable PB-455B, PB-456B and PB-457B from Pressure Transmitters PT-455, PT-456, and PT-457.
2/3 Detectors

D2

PRZR PRESS
SI
PORV BLOCK
P-11

PROBABLE CAUSE

1. Normal Primary System cooldown.
2. Primary Coolant leak.

AUTOMATIC ACTION

NOTE: Power Operated Relief Valves can be operated in Manual. ☐

1. PRZR PORVs Q1B31PCV444B and Q1B31PCV445A are automatically blocked to prevent opening on decreasing pressure.

OPERATOR ACTION

1. Check pressurizer pressure indications and determine the actual pressure. ☐
2. IF an instrument failure has occurred, THEN go to FNP-1-AOP-100, INSTRUMENT MALFUNCTION. ☐
3. IF the alarm is NOT due to plant cooldown OR a primary coolant leak is indicated, THEN perform the actions required by the appropriate AOP or EEP: ☐
   a) FNP-1-EEP-0, REACTOR TRIP OR SAFETY INJECTION.
   b) FNP-1-AOP-1.0, RCS LEAKAGE.
   c) FNP-1-AOP-2.0, STEAM GENERATOR TUBE LEAKAGE.
4. IF the alarm occurred as a result of reducing pressure during a normal plant cooldown, THEN BLOCK the pressurizer pressure safety injection in accordance with FNP-1-UOP-2.2, SHUTDOWN OF UNIT FROM HOT STANDBY TO COLD SHUTDOWN. ☐

References: A-177100, Sh. 372; U-260610; U-198768; D-177381; U-266647 PLS Document

LOCATION HD3

SETPOINT: Master Controller at 7.5% demand indicated Master Controller Demand Signal. (representing a nominal pressurizer pressure 100 PSI above the Master Controller reference potentiometer setting)

D3
PRZR CONT PRESS OUTPUT HI

ORIGIN: Pressure Bistable PB-444E from Pressure Transmitter PT-444 via Master Pressure Controller PC444A.

PROBABLE CAUSE

1. Step Load Reduction.
2. Rod Control System Malfunction.
3. Pressure Control System malfunction.
4. Instrument failure or in test.

AUTOMATIC ACTION

1. PORV PCV444B opens at 7.5% demand on the Master Pressure Controller PC444A (92.5% controller output equivalent to a nominal 2335 psig).
2. Pressurizer spray valves in automatic should be fully open.

OPERATOR ACTION

1. Monitor for possible PORV lifting. ☐
2. Check pressurizer pressure indications and determine the actual pressure. ☐
3. IF an instrument failure has occurred, THEN go to FNP-1-AOP-100, INSTRUMENT MALFUNCTION. ☐
4. Check the status of the following and take manual control as necessary: ☐
   - Pressurizer Sprays;
   - Power Operated Relief Valves;
   - Pressurizer Heaters
5. IF the alarm is caused by a rod control system malfunction, THEN take MANUAL rod control in accordance with FNP-1-AOP-19.0, MALFUNCTION OF ROD CONTROL SYSTEM. ☐
6. Maintain reactor coolant system pressure at 2235 psig with the affected component(s) in manual control until automatic operation can be restored. ☐
7. IF a Power Operated Relief Valve is leaking OR is malfunctioning, THEN isolate the affected relief valve and refer to Tech. Spec. 3.4.11 for LCO requirements. ☐
8. IF the pressurizer power operated relief valves operated, THEN:
   a) Refer to FNP-1-SOP-1.2, REACTOR COOLANT PRESSURE RELIEF SYSTEM, for cooldown of the pressurizer relief tank. ☐
   b) Refer to FNP-0-SOP-0, GENERAL INSTRUCTIONS TO OPERATIONS PERSONNEL, for reporting requirements. ☐
9. IF alarm actuated with pressurizer pressure less than 2335 psig, THEN verify the pressurizer master controller potentiometer setting using the plant curve book ☐

References: A-177100, Sh. 373; U-260610; U-266647 PLS Document; Westinghouse 7300 Dwg 7378D55; Technical Specifications

LOCATION HD4

SETPOINT: Not Applicable

D4

PRZR HTR
CONT TRBL

ORIGIN: Relay (RY1) located in Pressurizer Heater Controller

PROBABLE CAUSE

1. Blown fuse.
2. Faulty diode.
3. SCR failure / cabinet high temperature.
4. 1C pressurizer heater group supply breaker open.

AUTOMATIC ACTION

NONE

OPERATOR ACTION

1. Place group 1C PRZR HTR GROUP VARIABLE switch in the "OFF" position. ☐
2. Control pressurizer pressure manually, using the other banks of heaters. Refer to annunciator window HC1, PRZR PRESS HI-LO. ☐
3. Notify appropriate personnel to locate and correct the fault. ☐
4. Return pressurizer heaters group 1C to service as soon as possible. ☐

NOTE: Loss of power to the 1C pressurizer heater group will cause this alarm. WHEN the cause of the alarm has been corrected, THEN the 1C variable pressurizer heater group supply breaker must be closed to clear the alarm. ☐

5. To restore the 1C heater group momentarily place the 1C PRZR HTR GROUP VARIABLE switch to the "ON" position. ☐

References: A-177100, Sh. 374; U-211006; U-198805, U198707

LOCATION HD5

SETPOINT: Variable Current/Time

D5
PRZR HTR BKR TRIPPED

ORIGIN:
1. Group 1A: 74 Relay in Breaker EA11 Control Circuit.
2. Group 1B: 74 Relay in Breaker EC11 Control Circuit.
3. Group 1C: Alarm Switch in Breaker EM04 Control Circuit.
4. Group 1D: 74 Relay in Breaker EM05 Control Circuit.
5. Group 1E: 74 Relay in Breaker EN05 Control Circuit.

PROBABLE CAUSE

NOTE: This annunciator has REFLASH capability. ☐

1. One or more groups of Pressurizer Heater Breakers tripped on overcurrent.

AUTOMATIC ACTION

NONE

OPERATOR ACTION

1. Determine which pressurizer heater group breaker has tripped. ☐
2. Refer to annunciator window HC1, PRZR PRESS HI-LO. ☐
3. IF required, THEN limit plant transients until the heaters can be returned to normal. ☐
4. Notify appropriate personnel to determine and correct the cause of the breaker trip. ☐
5. Refer to Technical Specification 3.4.9 for LCO requirements. ☐

References: A-177100, Sh. 375; D-177107; D-177109; D-177111; D-177112; D-177113; Technical Specifications

LOCATION HE1

SETPOINT: Not Applicable

E1
REL VLV 444B/445A OPEN

ORIGIN: Valve Position Switch (33) from PRZR PORV Q1B31PCV444B OR Q1B31PCV445A

PROBABLE CAUSE

1. One or both PRZR PORVs Q1B31PCV444B and Q1B31PCV445A has lifted.

AUTOMATIC ACTION

NONE

OPERATOR ACTION

1. Check pressurizer relief valve discharge line temperature indication and relief valve position indications to determine if a relief valve has lifted. ☐
2. Monitor pressurizer pressure and level and reactor coolant system temperatures. ☐
3. IF a relief valve has lifted due to high system pressure, THEN ensure that the relief valve closes when system pressure has been reduced. ☐
4. IF a relief valve lifted due to instrument failure AND actual pressure is low, THEN close the affected valve in manual and refer to annunciator window HC1, PRZR PRESS HI-LO. ☐
5. IF a relief valve fails to close following an actuation, THEN place the control handswitch for the affected relief valve to the closed position. ☐
6. IF a PRZR PORV fails to reseat OR does NOT close when the control handswitch is placed in the closed position, THEN isolate the affected relief valve by closing valve Q1B31MOV8000A to isolate PRZR PORV PCV-445A and/or valve Q1B31MOV8000B to isolate PRZR PORV PCV-444B. ☐
7. Refer to Technical Specification 3.4.11 for LCO requirements. ☐
8. WHEN plant conditions permit, THEN notify appropriate personnel to determine and correct the cause of the relief valve failing to close. ☐
9. IF a PRZR PORV opened, THEN refer to FNP-0-SOP-0, GENERAL INSTRUCTIONS TO OPERATIONS PERSONNEL, for reporting requirements. ☐

References: A-177100, Sh. 376; B-181608, Sh. 16 & 17; D-175037, Sh. 2; PCN 90-1-6387; Technical Specification

LOCATION HE2

SETPOINT: Not Applicable

ORIGIN: Pressurizer Safety Valve Position Limit Switches
1. Q1B13ZS2034
2. Q1B13ZS2035
3. Q1B13ZS2036

E2
SAFETY VLV 8010A/B/C OPEN

PROBABLE CAUSE

NOTE: The safety valve lift setpoint is 2485 psig. ☐

1. One or more Pressurizer Safety Valves has lifted.

AUTOMATIC ACTION

NONE

OPERATOR ACTION

1. Check pressurizer safety valve discharge line temperature indications and safety valve position indications to determine if a safety valve has lifted and which valve lifted. ☐
2. Monitor pressurizer pressure and level and reactor coolant system temperatures. ☐
3. IF a safety valve has lifted due to high system pressure, THEN verify that the safety valve reseats when system pressure has been reduced. ☐
4. IF a safety valve fails to close following an actuation, THEN refer to FNP-1-EEP-0, REACTOR TRIP OR SAFETY INJECTION. ☐
5. IF a safety valve has lifted due to an instrument failure, THEN refer to annunciator window HC1, PRZR PRESS HI-LO. ☐
6. IF a safety valve has lifted and reseats, and subsequently lifts and reseats at approximately the same RCS pressure, THEN maintain RCS pressure less than lift pressure AND comply with Tech Specs 3.4.1 and 2.1.1 limits. ☐
7. Following an actuation, IF a safety valve fails to fully reseat OR is leaking, THEN:
   a) Start additional charging pumps and increase charging flow as necessary to maintain pressurizer level. ☐
   b) Refer to FNP-1-AOP-1.0, RCS LEAKAGE. ☐
8. IF plant conditions permit, THEN notify appropriate personnel to determine and correct the cause of the safety valve failing to close or reseat properly. ☐
9. Refer to TRM 13.4.4, and Tech Spec 3.4.10 for LCO requirements. ☐
9. IF a PRZR SAFETY VLV opened, THEN refer to FNP-0-SOP-0, GENERAL INSTRUCTIONS TO OPERATIONS PERSONNEL, for reporting requirements. ☐

References: A-177100, Sh. 377; D-181774, Sh. 2; D-175037, Sh. 2; Technical Specification

LOCATION HE3

SETPOINT: 125°F

ORIGIN: Temperature Bistable TB-471 from Temperature Element TE-471

E3
PRT TEMP HI

PROBABLE CAUSE

1. One of the following valves lifted or is leaking into the Pressurizer Relief Tank in excessive quantities.
   a) Pressurizer Safety Valves
   b) Pressurizer Power Operated Relief Valves
   c) CVCS Letdown Relief Valve
2. Instrument malfunction.
3. During Shutdown conditions, an RHR Suction or Discharge Relief Valve lifted.

AUTOMATIC ACTION

NONE

OPERATOR ACTION

1. Determine the actual temperature as indicated by TI-471, on the MCB. ☐
2. Monitor pressurizer pressure and pressurizer relief tank pressure, level and temperature. ☐
3. Check for high or increasing temperature indications downstream of the pressurizer safety valves, power operated relief valves, and CVCS letdown relief valve. ☐
4. IF a pressurizer safety valve OR power operated relief valve has actuated, THEN verify that the valve closes when system pressure is reduced. ☐
5. IF a pressurizer safety valve is leaking OR fails to close following an actuation, THEN perform the actions required by FNP-1-AOP-1.0, RCS LEAKAGE. ☐

NOTE: Technical Specification 3.4.11 addresses operation with a PRZR PORV ISO valve closed. ☐

6. IF a PRZR PORV is leaking OR fails to close following an actuation, THEN:
   6.1 Isolate the relief valves by closing both PRZR PORV ISOs Q1B31MOV8000A & B. ☐
   6.2 Refer to FNP-1-ARP-1.8, HA5, to determine the leaking valve. ☐
7. IF the CVCS letdown relief valve is leaking OR has lifted, THEN go to FNP-1-AOP-16.0 CVCS MALFUNCTION. ☐
8. IF an RHR system suction OR discharge relief valve is determined to be leaking, THEN isolate the affected RHR Train PER FNP-1-SOP-7.0, RESIDUAL HEAT REMOVAL SYSTEM ☐
9. Commence cooling the contents of the pressurizer relief tank (PRT) in accordance with FNP-1-SOP-1.2, REACTOR COOLANT PRESSURE RELIEF SYSTEM. ☐
10. IF the alarm was caused by an instrument OR component failure, THEN notify appropriate personnel to determine the cause and correct the fault ☐

References: A-177100, Sh. 378; U-260610; D-175037, Sh. 2; U-266647 PLS Document

LOCATION HE4

E4
PRT LVL HI-LO

SETPOINT: 1. High Level: 78%
2. Low Level: 68%

ORIGIN: 1. Level Bistable LB-470A from Level Transmitter LT-470.
2. Level Bistable LB-470B from Level Transmitter LT-470.

PROBABLE CAUSE

1. High Level
   One of the following valves has lifted or is leaking into the Pressurizer Relief Tank.
   a) Pressurizer Safety Valves.
   b) Pressurizer Power Operated Relief Valves.
   c) CVCS Letdown Relief Valve.
   d) CVCS seal Return Relief Valve.
   e) CVCS Charging Pump Suction Relief Valves.
   f) RHR System Suction or Discharge Relief Valves, during Shutdown conditions.
2. Low Level
   a) Leakage from the Pressurizer Relief Tank to the Reactor Coolant Drain Tank.
3. Instrument malfunction.

AUTOMATIC ACTION

NONE

OPERATOR ACTION

1. Determine if the level is high or low as indicated by LI-470, on the MCB. ☐
2. Monitor pressurizer pressure and pressurizer relief tank pressure, level and temperature. ☐
3. IF level is high, THEN:
   3.1 Check for high or increasing temperature indications downstream of the pressurizer safety valves, power operated relief valves and CVCS Ltdn relief valve. ☐
   3.2 IF a pressurizer safety valve OR power operated relief valve has actuated, THEN verify that the valve closes when system pressure is reduced. ☐
4. IF level is low, THEN ensure that PRT DRN ISO N1B31HV8031 is shut. ☐
5 IF a pressurizer safety valve is leaking OR fails to close following an actuation, THEN perform the actions required by FNP-1-AOP-1.0, RCS LEAKAGE. ☐

NOTE: Technical Specification 3.4.11 addresses operation with a PRZR PORV ISO valve closed. ☐

6. IF a PRZR PORV is leaking OR fails to close following an actuation, THEN:
   a) Isolate the relief valves by closing both PRZR PORV ISOs Q1B31MOV8000A & B. ☐
   b) Refer to FNP-1-ARP-1.8, HA5, to determine the leaking valve. ☐

LOCATION HE4

OPERATOR ACTION (cont.)

7. IF the CVCS letdown relief valve is leaking OR has lifted, THEN go to FNP-1-AOP-16.0 CVCS MALFUNCTION. ☐
8. IF an RHR system suction OR discharge relief valve is determined to be leaking, THEN isolate the affected RHR Train in accordance with FNP-1-SOP-7.0, RESIDUAL HEAT REMOVAL SYSTEM. ☐
9. IF the level increase is due to leakage from the charging system suction relief OR the seal return relief valve, THEN isolate the affected valve if possible. ☐
10. Fill or drain the pressurizer relief tank (PRT) in accordance with FNP-1-SOP-1.2, REACTOR COOLANT PRESSURE RELIEF SYSTEM, as required to return level to normal. ☐
11. IF the alarm was caused by an instrument OR component failure, THEN notify appropriate personnel to determine the cause and correct the fault. ☐

References: A-177100, Sh. 379; U-260610; D-175037, Sh. 2; U-266647 PLS Document; FNP-1-IMP-201.28

LOCATION HE5

SETPOINT: 7.5 PSIG

ORIGIN: Pressure Bistable PB-472 from Pressure Transmitter PT-472

E5
PRT PRESS HI

PROBABLE CAUSE

1. One of the following valves has lifted or is leaking into the Pressurizer Relief Tank.
   a) Pressurizer Safety Valves.
   b) Pressurizer Power Operated Relief Valves.
   c) CVCS Letdown Relief Valve.
   d) CVCS Seal Return Relief Valve.
   e) CVCS Charging Pump Suction Relief Valves.
   f) RHR System Suction or Discharge Relief Valves, during Shutdown conditions.
2. Nitrogen Regulator malfunction.
3. Instrument malfunction.

AUTOMATIC ACTION

NONE

OPERATOR ACTION

1. Determine the actual pressure as indicated by PI-472, on the MCB. ☐
2. Monitor pressurizer pressure and pressurizer relief tank pressure, level and temperature. ☐
3. Check for high or increasing temperature indications downstream of the pressurizer safety valves, power operated relief valves and CVCS letdown relief valve. ☐
4. IF a pressurizer safety valve OR power operated relief valve has actuated, THEN verify that the valve closes when system pressure is reduced. ☐
5. IF a nitrogen regulator malfunction exists, THEN isolate the nitrogen supply to the pressurizer relief tank in accordance with FNP-1-SOP-1.2, REACTOR COOLANT PRESSURE RELIEF SYSTEM. ☐
6. IF a Pressurizer Safety Valve is leaking OR fails to close following an actuation, THEN perform the actions required by FNP-1-AOP-1.0, RCS LEAKAGE. ☐

OPERATOR ACTION (cont)

NOTE: Technical Specification 3.4.11 addresses operation with a PRZR PORV ISO valve closed. ☐

7. IF a PRZR PORV is leaking OR fails to close following an actuation, THEN:
   a) Isolate the relief valves by closing both PRZR PORV ISOs Q1B31MOV8000A & B. ☐
   b) Refer to FNP-1-ARP-1.8/HA5, to determine the leaking valve. ☐
8. IF the CVCS letdown relief valve is leaking OR has lifted, THEN go to FNP-1-AOP-16.0, CVCS MALFUNCTION. ☐

NOTE: Consideration may be given to reference FNP-1-AOP-12.0, RHR SYSTEM MALFUNCTION, specifically step 8.0, for additional guidance to that provided by SOP-7.0 in the following step. ☐

9. IF an RHR system suction OR discharge relief valve is determined to be leaking, THEN isolate the affected RHR per FNP-1-SOP-7.0, RESIDUAL HEAT REMOVAL SYSTEM. ☐
10. IF the pressure increase is due to leakage from the charging system suction relief OR the seal return relief valve, THEN isolate the affected valve if possible. ☐
11. Return the pressurizer relief tank (PRT) pressure to normal in accordance with FNP-1-SOP-1.2, REACTOR COOLANT PRESSURE RELIEF SYSTEM. ☐
12. IF the alarm was caused by an instrument OR component failure, THEN notify appropriate personnel to determine the cause and correct the fault. ☐

References: A-177100, Sh. 380; U-260610; D-175037, Sh. 2; U-266647 PLS Document

LOCATION HF1

SETPOINT: ± 3°F Deviation from TAVG Median

ORIGIN: Temperature Bistables TB-408A, TB-408B and TB-408C each fed by median selected TAVG, Cold Leg Temperature Detectors TE-412D, TE-422D, TE-432D and Hot Leg Loop Average Temperature Detectors TE-412B1, B2, B3, TE-422B1, B2, B3 and TE-432B1, B2, B3

F1
RX COOLANT LOOPS TAVG DEV HI-LO

PROBABLE CAUSE

NOTE: This annunciator has REFLASH capability. ☐

1. Unbalanced Steam Flows from the Steam Generators.
2. Uneven Feedwater Flows to the Steam Generators.
3. Loss of Flow in a Reactor Coolant Loop.
4. Instrument failure.

AUTOMATIC ACTION

NONE

OPERATOR ACTION

1. Check loop temperature indications and determine which loop has the temperature deviation. ☐
2. Monitor reactor coolant, steam and feed system flows:
   a) IF an imbalance in steam OR feedflow exists, THEN determine the cause of the imbalance. ☐
   b) IF possible, THEN correct the imbalance to clear the alarm. ☐
3. IF an instrument failure has occurred, THEN go to FNP-1-AOP-100, INSTRUMENT MALFUNCTION. ☐
4. IF a loss of flow has occurred, THEN refer to FNP-1-AOP-4.0, LOSS OF REACTOR COOLANT FLOW. ☐

References: A-177100, Sh. 381; U-260610; U-266647 PLS Document; PCN B88-1-5259

LOCATION HF2

SETPOINT: ± 6°F Deviation from ΔT median

F2
RX COOLANT LOOPS ΔT DEV HI-LO

ORIGIN: Temperature Bistables TB-409A, TB-409B and TB-409C each fed from median selected ΔT, Cold Leg Temperature Detectors TE-412D, TE-422D, TE-432D and Hot Leg Temperature Detectors TE-412B1, B2, B3, TE-422B1, B2, B3 and TE-432B1, B2, B3

PROBABLE CAUSE

NOTE: This annunciator has REFLASH capability. ☐

1. Unbalanced Steam Flows from the Steam Generators.
2. Uneven Feedwater Flows to the Steam Generators.
3. Loss of Flow in a Reactor Coolant Loop.
4. Instrument failure.

AUTOMATIC ACTION

NONE

OPERATOR ACTION

1. Check loop temperature indications and determine which loop has the temperature deviation. ☐
2. Monitor reactor coolant, steam and feed system flows:
   a) IF an imbalance in steam OR feedflow exists, THEN determine the cause of the imbalance. ☐
   b) IF possible, THEN correct the imbalance to clear the alarm. ☐
3. IF an instrument failure has occurred, THEN go to FNP-1-AOP-100, INSTRUMENT MALFUNCTION. ☐
4. IF a loss of flow has occurred, THEN refer to FNP-1-AOP-4.0, LOSS OF REACTOR COOLANT FLOW. ☐

References: A-177100, Sh. 382; U-260610; U-266647 PLS Document; PCN B88-1-5259; PCN B88-1-5301

LOCATION HF3

SETPOINT: ±5°F

ORIGIN: Temperature Bistables TB-408D, fed from median selected T_{AVG} and Turbine Impulse selected chamber pressure.

F3
TAVG/TREF DEV

PROBABLE CAUSE

NOTE:
- **Zinc Addition System injection will result in a continuous RCS dilution of as much as 1.7 gph, which may raise T_{AVG} if not compensated for.** ☐
- **This annunciator has REFLASH capability.** ☐

1. Load Transient while in Manual Rod Control.
2. Rod Control System malfunction.
3. Instrument loop failure.
4. Primary Plant Cooldown below 547°F (T_{REF} Bottom Limit)
5. RCS dilution or boration.

AUTOMATIC ACTION

NONE

OPERATOR ACTION

1. Monitor loop temperature indications and turbine impulse pressure indications and verify an actual average temperature deviation. ☐
2. IF an instrument failure has occurred, THEN go to FNP-1-AOP-100, INSTRUMENT MALFUNCTION. ☐
3. IF in manual rod control, THEN control the power transient and match T_{AVG} with T_{REF}. ☐
4. IF a rod control system malfunction exists, THEN take manual rod control in accordance with FNP-1-AOP-19.0, MALFUNCTION OF ROD CONTROL SYSTEM. ☐
5. IF the alarm is due to a plant startup OR cooldown in progress, THEN no action is required. ☐
6. Refer to Technical Specifications for LCO requirements. ☐

References: A-177100, Sh. 383; U-260610; U-266647 PLS Document; Technical Specifications; PCN B88-1-5259

LOCATION HF4

SETPOINT: 543°F

F4
RX COOLANT LOOPS 1A, 1B OR 1C TAVG LO-LO

ORIGIN: Temperature Bistables TB-412E, TB-422E and TB-432E from Cold Leg Temperature Detectors TE-412D, TE-422D, TE-432D and the average of the three Hot Leg Temperature Detectors on each loop TE-412B1, B2, B3, TE-422B1, B2, B3 and TE-432B1, B2, B3

PROBABLE CAUSE

NOTE: This annunciator has REFLASH capability. ☐

1. Failure of the Rod Control System on an Up-Power Maneuver.
2. Loss of Flow in a Reactor Coolant Loop.
3. Excessive Feedwater addition to Steam Generators during Startup.
4. Primary Plant Cooldown below 543°F.
5. Instrument failure.

AUTOMATIC ACTION

1. Lo-Lo T_{AVG}, 2/3 coincidence, blocks automatic Steam Dump operation.

OPERATOR ACTION

1. Check loop temperature indications and verify an actual low-low T_{AVG} condition. ☐
2. IF an instrument failure has occurred, THEN go to FNP-1-AOP-100, INSTRUMENT MALFUNCTION. ☐
3. Monitor reactor coolant, steam and feed system flows. ☐
4. IF a rod control system malfunction exists, THEN take manual rod control in accordance with FNP-1-AOP-19.0, MALFUNCTION OF ROD CONTROL SYSTEM. ☐
5. IF a loss of flow has occurred, THEN refer to FNP-1-AOP-4.0, LOSS OF REACTOR COOLANT FLOW. ☐
6. IF the alarm was caused by feedwater addition to the Steam Generators during startup, THEN decrease the feedwater addition rate and restore loop temperatures to normal. ☐
7. IF the alarm is due to plant cooldown below 543°F, THEN no action is required. ☐
8. Refer to Technical Specifications 3.4.2 for LCO requirements. ☐

References: A-177100, Sh. 384; U-260610; U-198768; U-266647 PLS Document; PCN B88-1-5259

LOCATION HF5

SETPOINT: 4°F above Full Load Tavg

ORIGIN: Temperature Bistables TB-412D, TB-422D and TB-432D from Cold Leg Temperature Detectors TE-412D, TE-422D, TE-432D and the average of the three Hot Leg Temperature Detectors on each loop TE-412B1, B2, B3, TE-422B1, B2, B3 and TE-432B1, B2, B3

F5
RX COOLANT LOOPS TAVG HI

PROBABLE CAUSE

NOTE: Zinc Addition System injection will result in a continuous RCS dilution of as much as 1.7 gph, which may raise T_{AVG} if not compensated for. ☐

1. Load Reduction while in Manual Rod Control.
2. Rod Control System malfunction.
3. Instrument failure.
4. RCS dilution.

AUTOMATIC ACTION

NONE

OPERATOR ACTION

1. Check loop temperature indications and verify an actual high T_{AVG} condition. ☐
2. IF an instrument failure has occurred, THEN go to FNP-1-AOP-100, INSTRUMENT MALFUNCTION ☐
3. IF a rod control system malfunction exists, THEN take manual rod control in accordance with FNP-1-AOP-19.0, MALFUNCTION OF ROD CONTROL SYSTEM. ☐
4. IF rod control is in manual, THEN reduce the load transient and match T_{AVG} with T_{REF}. ☐
5. Refer to Technical Specifications, section 3.3.1 and 3.3.2 for LCO requirements. ☐

References: A-177100, Sh. 385; U-260610; U-266647 PLS Document; PCN B88-1-5259

LOCATION HG1

SETPOINT: 1.25 inches above Normal Level

ORIGIN: 1. Upper Reservoir: Level Switch LS-417
2. Lower Reservoir: Level Switch LS-419

G1
RCP 1A BRG UPPER/LOWER OIL RES HI LVL

PROBABLE CAUSE

1. Inleakage of Component Cooling Water.
2. Excessive heating of oil after pump start.
3. Instrument malfunction.

AUTOMATIC ACTION

NONE

OPERATOR ACTION

1. Continuously monitor 1A RCP bearing temperatures. ☐

NOTE: WHEN transitioning to FNP-1-EEP-0.0 AND at the Shift Supervisors direction, it is ACCEPTABLE for one team member to complete the Immediate Operator Actions of FNP-1-EEP-0.0. While the other team member verifies a Reactor Trip, THEN trips the appropriate RCP(s) before finishing the Immediate Operator Actions of FNP-1-EEP-0.0. (AI 2004200019) ☐

2. IF any 1A RCP motor bearing temperature exceeds 195°F, THEN perform the following actions:
   a) Trip the reactor, AND go to FNP-1-EEP-0.0, REACTOR TRIP OR SAFETY INJECTION. ☐
   b) Stop 1A RCP. ☐
   c) Perform the actions required by FNP-1-AOP-4.0, LOSS OF REACTOR COOLANT FLOW. ☐
   d) Manually close pressurizer spray valve, PK 444C ☐
3. At the direction of the Operations Manager, reduce power as necessary to permit a containment entry. ☐
4. As soon as practical make a containment entry to determine the cause for the bearing oil reservoir high level and the extent of any damage. ☐
5. IF instrument malfunction was the cause of the alarm, THEN perform the following actions:
   a) Notify appropriate personnel. ☐
   b) Determine the cause and correct the instrument fault. ☐
   c) Return the instrument to normal as soon as possible. ☐

OPERATOR ACTION (cont.)

6. Correct the cause and any damage that has resulted. ☐
7. Return the Reactor Coolant Pump to service as soon as possible. ☐
8. IF the cause of the alarm can NOT be corrected AND a determination has been made to continue operating, THEN perform the following:
   8.1 Monitor the following parameters at an increased frequency to be determined by the Operations Shift Manager: ☐
   CCW Surge Tank Level
   1A RCP bearing temperatures
   8.2 Initiate a CR for Maintenance to defeat the input from LS-417 or LS-419 to restore alarm capability for the LS that is not causing the alarm by jumpering the appropriate terminals in annunciator cabinet "1D" N1H25L040D-N per the following: ☐

RESERVOIR	LEVEL SWITCH	TERMINALS	DRAWING A177100
Upper	N1B41LS0417	SP-37A (H61A) SP-37B (H61B)	Sh. 386
Lower	N1B41LS0419	SP-37B (H71A) SP-37C (H71B)	Sh. 386 & 391

   8.3 Initiate a second CR for Maintenance to remove the jumper installed per step 8.2 when the jumper is no longer required. ☐
   8.4 Place caution tag stating which input to the alarm is defeated near annunciator window HG1. Caution tag cover sheet shall reference the CR in step 8.3. ☐

References: A-177100, Sh. 386 and 391; A-181541 Sh. F-H and F-4; U-258242; D-175037, Sh. 3; U-266647 PLS Document

LOCATION HG2

SETPOINT: 1.25 inches above Normal Level

ORIGIN: 1. Upper Reservoir: Level Switch LS-427
2. Lower Reservoir: Level Switch LS-429

G2
RCP 1B BRG UPPER/LOWER OIL RES HI LVL

PROBABLE CAUSE

1. Inleakage of Component Cooling Water.
2. Excessive heating of oil, after pump start.
3. Instrument malfunction.

AUTOMATIC ACTION

NONE

OPERATOR ACTION

1. Continuously monitor RCP 1B bearing temperatures. ☐

NOTE: WHEN transitioning to FNP-1-EEP-0.0 AND at the Shift Supervisors direction, it is ACCEPTABLE for one team member to complete the Immediate Operator Actions of FNP-1-EEP-0.0. While the other team member verifies a Reactor Trip, THEN trips the appropriate RCP(s) before finishing the Immediate Operator Actions of FNP-1-EEP-0.0. (AI 2004200019) ☐

2. IF any 1B RCP motor bearing temperature exceeds 195°F, THEN perform the following actions:
   a) Trip the reactor, AND go to FNP-1-EEP-0.0, REACTOR TRIP OR SAFETY INJECTION. ☐
   b) Stop 1B RCP. ☐
   c) Perform the actions required by FNP-1-AOP-4.0, LOSS OF REACTOR COOLANT FLOW. ☐
   d) Manually close pressurizer spray valve, PK 444D ☐
3. At the direction of the Operations Manager, reduce power as necessary to permit a containment entry. ☐
4. As soon as practical make a containment entry to determine the cause for the bearing oil reservoir high level and the extent of any damage. ☐
5. IF instrument malfunction was the cause of the alarm, THEN perform the following actions:
   a) Notify appropriate personnel. ☐
   b) Determine the cause and correct the instrument fault. ☐
   c) Return the instrument to normal as soon as possible. ☐

OPERATOR ACTION (cont.)

6. Correct the cause and any damage that has resulted. ☐
7. Return the Reactor Coolant Pump to service as soon as possible. ☐
8. IF the cause of the alarm can NOT be corrected AND a determination has been made to continue operating, THEN perform the following:
   - 8.1 Monitor the following parameters at an increased frequency to be determined by the Operations Shift Manager:
     - 8.1.1 CCW Surge Tank Level ☐
     - 8.1.2 1B RCP bearing temperatures ☐
   - 8.2 Initiate a CR for Maintenance to defeat the input from LS-427 or LS-429 to restore alarm capability for the LS that is not causing the alarm by jumpering the appropriate terminals in annunciator cabinet "1D" N1H25L040D-N per the following: ☐

RESERVOIR	LEVEL SWITCH	TERMINALS	DRAWING A177100
Upper	N1B41LS0427	SP-42A (H62A) SP-42B (H62B)	Sh. 387
Lower	N1B41LS0429	SP-42B (H72A) SP-42C (H72B)	Sh. 387 & 392

   - 8.3 Initiate a second CR for Maintenance to remove the jumper installed per step 8.2 when the jumper is no longer required. ☐
   - 8.4 Place caution tag stating which input to the alarm is defeated near annunciator window HG2. Caution tag cover sheet shall reference the CR in step 8.3. ☐

References: A-177100, Sh. 387 and 392; D-175037, Sh. 3; U-258242; A-181541 Sh. F-H and F-4; U-266647 PLS Document

LOCATION HG3

SETPOINT: 1.25 inches above Normal Level

ORIGIN: 1. Upper Reservoir: Level Switch LS-437
2. Lower Reservoir: Level Switch LS-439

G3
RCP 1C BRG UPPER/LOWER OIL RES HI LVL

PROBABLE CAUSE

1. Inleakage of Component Cooling Water.
2. Excessive heating of oil, after pump start.
3. Instrument malfunction.

AUTOMATIC ACTION

NONE

OPERATOR ACTION

1. Continuously monitor RCP 1C bearing temperatures. ☐

NOTE: WHEN transitioning to FNP-1-EEP-0.0 AND at the Shift Supervisors direction, it is ACCEPTABLE for one team member to complete the Immediate Operator Actions of FNP-1-EEP-0.0. While the other team member verifies a Reactor Trip, THEN trips the appropriate RCP(s) before finishing the Immediate Operator Actions of FNP-1-EEP-0.0. (AI 2004200019) ☐

2. IF any RCP 1C motor bearing temperature exceeds 195°F, THEN perform the following actions:
   a) Trip the reactor, AND go to FNP-1-EEP-0.0, REACTOR TRIP OR SAFETY INJECTION. ☐
   b) Stop RCP 1C. ☐
   c) Perform the actions required by FNP-1-AOP-4.0, LOSS OF REACTOR COOLANT FLOW. ☐
3. At the direction of the Operations Manager, reduce power as necessary to permit a containment entry. ☐
4. As soon as practical make a containment entry to determine the cause for the bearing oil reservoir high level and the extent of any damage. ☐
5. IF instrument malfunction was the cause of the alarm, THEN perform the following actions:
   a) Notify appropriate personnel. ☐
   b) Determine cause and correct the instrument fault. ☐
   c) Return the instrument to normal as soon as possible. ☐

OPERATOR ACTION (cont)

6. Correct the cause and any damage that has resulted. ☐
7. Return the Reactor Coolant Pump to service as soon as possible. ☐
8. IF the cause of the alarm can NOT be corrected AND a determination has been made to continue operating, THEN perform the following:
   - 8.1 Monitor the following parameters at an increased frequency to be determined by the Operations Shift Manager:
     - 8.1.1 CCW Surge Tank Level ☐
     - 8.1.2 1C RCP bearing temperatures ☐
   - 8.2 Initiate a CR for Maintenance to defeat the input from LS-437 or LS-439 to restore alarm capability for the LS that is not causing the alarm by jumpering the appropriate terminals in annunciator cabinet "1D" N1H25L040D-N per the following: ☐

RESERVOIR	LEVEL SWITCH	TERMINALS	DRAWING A177100
Upper	N1B41LS0437	SP-44A (H63A) SP-44B (H63B)	Sh. 388
Lower	N1B41LS0439	SP-44B (H73A) SP-44C (H73B)	Sh. 388 & 393

   - 8.3 Initiate a second CR for Maintenance to remove the jumper installed per step 8.2 when the jumper is no longer required. ☐
   - 8.4 Place caution tag stating which input to the alarm is defeated near annunciator window HG3. Caution tag cover sheet shall reference the CR in step 8.3. ☐

References: A-177100, Sh. 388 and 393; D-175037, Sh. 3; U-258242; A-181541, Sh. F-H and F-4; U-266647 PLS Document

LOCATION HG4

G4
OMS REL VLV PATH CLOSED AT LO TEMP

SETPOINT: Valve leaving Full Open position.

ORIGIN:
1. MOV Limit Switch from any of the following valves:
   a) Q1E11MOV8701A
   b) Q1E11MOV8702A
   c) Q1E11MOV8701B
   d) Q1E11MOV8702B
2. RCS Solid Control Handswitch not in "Defeat" (N1H11HS2121-N)

PROBABLE CAUSE

1. Closure of one or more of the RHR System valves.

AUTOMATIC ACTION

NONE

OPERATOR ACTION

1. Determine if the valves were inadvertently closed. ☐
2. IF the valves were inadvertently closed, THEN open the valves, per FNP-1-SOP-7.0, RESIDUAL HEAT REMOVAL SYSTEM. ☐
3. Refer to Technical Specifications 3.4.12 for LCO requirements. ☐

References: A-177100, Sh. 389; D-177569; D-177572; D-177838; D-177839; Technical Specifications.

LOCATION HG5

SETPOINT: 425 PSIG

ORIGIN: Pressure Bistable PB-403AB from Pressure Transmitter PT-402 or PT-403 (RCS Solid Control Handswitch N1H11HS2121 must be selected to PT 402 or 403)

G5
SOLID RCS PRESS HI

PROBABLE CAUSE

1. Reactor Coolant System heatup.
2. Insufficient Letdown Flow.
3. Inadvertent closure of RHR Suction from RCS Valves Q1E11MOV8701A (B) and/or Q1E11MOV8702A (B).
4. Malfunction of one of the following valves:
   a) Letdown Pressure Control Valve Q1E21PCV145.
   b) Charging Flow Control Valve Q1E21FCV122.
   c) RHR to Letdown Flow Control Valve Q1E21HCV142.
5. Instrument malfunction

AUTOMATIC ACTION

NOTE: IF RCS Pressure increases to 700 PSIG AND power is available to the MOV's, THEN RHR suction from RCS valves Q1E11MOV8701A & B and Q1E11MOV8702A & B will automatically close. ☐

OPERATOR ACTION

1. Check indications and determine actual reactor coolant system pressure. ☐
2. IF the high pressure is due to an inadvertent closure of valves Q1E11MOV8701A (B) OR Q1E11MOV8702A (B), THEN:
   a) Stop the running charging pump. ☐
   b) IF the RCS loop suction valves have closed for a running RHR pump, THEN secure that RHR pump AND perform the actions specified in FNP-1-AOP-12.0, RESIDUAL HEAT REMOVAL SYSTEM MALFUNCTION. ☐
   c) Increase letdown flow to maximum. IF required, THEN swap LP LETDOWN to the opposite RHR Train using FNP-1-SOP-7.0, RHR SYSTEM. ☐

NOTE: RCP seal ΔP must be greater than 200 psid for pump operation. ☐

   d) WHEN pressure has decreased to 400 PSIG, THEN reopen valves Q1E11MOV8701A (B) and Q1E11MOV8702A (B). ☐

LOCATION HG5

OPERATOR ACTION (cont)

3. IF the high pressure is caused by reduced letdown flow, THEN:
   a. IF PK 145 has failed, THEN take manual control of LP LTDN PRESS PK 145 and increase letdown flow to reduce pressure. ☐
   b. Verify open RHR TO LTDN HX HIK 142. Control as necessary to establish the desired letdown flowrate. ☐
   c. Adjust CHG FLOW FK 122 to decrease charging flow to the desired value. ☐

4. IF the high pressure is caused by excessive charging flow, THEN:
   a. Adjust CHG FLOW FK 122 to decrease charging flow to the desired value. ☐
   b. IF charging flow can NOT be reduced promptly, THEN isolate charging flow by closing CHG PUMP TO REGENERATIVE HX Q1E21MOV8107 or Q1E21MOV8108. ☐
   c. Adjust LP LTDN PRESS PK 145 as required. ☐

5. IF an RHR relief valve has lifted, THEN closely monitor PRT parameters. ☐

6. IF the high pressure was caused by an instrument OR component failure, THEN perform the following:
   a. IF available, THEN select the alternate channel. ☐
   b. Notify appropriate personnel to determine the cause and correct the fault. ☐

7. WHEN conditions allow, THEN re-establish charging and letdown flow per FNP-1-SOP-2.1, CHEMICAL AND VOLUME CONTROL SYSTEM PLANT STARTUP AND OPERATION and FNP-1-SOP-7.0, RESIDUAL HEAT REMOVAL SYSTEM ☐

References: A-177100, Sh. 390; U-260610; D-175037, Sh. 1

LOCATION HH1

SETPOINT: 1.25 inches below Normal Level

ORIGIN: 1. Upper Reservoir: Level Switch LS-417
2. Lower Reservoir: Level Switch LS-419

H1
RCP 1A BRG UPPER/LOWER OIL RES LO LVL

PROBABLE CAUSE

1. Sight glass rupture.
2. Oil Leakage.
3. Instrument malfunction.

AUTOMATIC ACTION

NONE

OPERATOR ACTION

1. Continuously monitor 1A RCP bearing temperatures. ☐

NOTE: WHEN transitioning to FNP-1-EEP-0.0 AND at the Shift Supervisors direction, it is ACCEPTABLE for one team member to complete the Immediate Operator Actions of FNP-1-EEP-0.0. While the other team member verifies a Reactor Trip, THEN trips the appropriate RCP(s) before finishing the Immediate Operator Actions of FNP-1-EEP-0.0. (AI 2004200019) ☐

2. IF any 1A RCP motor bearing temperature exceeds 195°F, THEN perform the following actions:
   a) Trip the reactor, AND go to FNP-1-EEP-0.0, REACTOR TRIP OR SAFETY INJECTION. ☐
   b) Stop 1A RCP. ☐
   c) Perform the actions required by FNP-1-AOP-4.0, LOSS OF REACTOR COOLANT FLOW. ☐
   d) Manually close pressurizer spray valve, PK 444C. ☐
3. Generate a condition report to document the time of the initial alarm. ☐
4. Start an admin tracking sheet to document anytime the alarm clears and for any future alarms. ☐

OPERATOR ACTION (cont)

NOTE: The intent of the following step is to observe if the alarm will initially clear, and to monitor how long the alarm will stay clear. This should give some indication of the leak magnitude. ☐

It is not intended to continuously raise CCW temperature to it maximum limit to keep the alarm clear. (CR2003003074) ☐

5. Initially raise CCW temperature 5°F and to try and clear the alarm ☐
6. At the direction of the Operations Manager, reduce power as necessary to permit a containment entry. ☐
7. As soon as practical make a containment entry to determine the cause for the bearing oil reservoir low level and the extent of any damage. ☐
8. IF instrument malfunction was the cause of the alarm, THEN perform the following actions:
   a) Notify appropriate personnel. ☐
   b) Determine the cause and correct the instrument fault. ☐
   c) Return the instrument to normal as soon as possible. ☐
9. Correct the cause and any damage that has resulted. ☐
10. Return the Reactor Coolant Pump to service as soon as possible. ☐
11. IF the cause of the alarm can NOT be corrected AND a determination has been made to continue operating, THEN perform the following:
    11.1 Monitor the following parameters at an increased frequency to be determined by the Operations Shift Manager:
    11.1.1 CCW Surge Tank Level ☐
    11.1.2 1A RCP bearing temperatures ☐
    11.2 Initiate a CR for Maintenance to defeat the input from LS-417 or LS-419 to restore alarm capability for the LS that is not causing the alarm by jumpering the appropriate terminals in annunciator cabinet "1D" N1H25L040D-N per the following: ☐

RESERVOIR	LEVEL SWITCH	TERMINALS	DRAWING A177100
Upper	N1B41LS0417	SP-38A (H61C) SP-38B (H61D)	Sh. 391 & 386
Lower	N1B41LS0419	SP-38B (H71C) SP-38C (H71D)	Sh. 391

    11.3 Initiate a second CR for Maintenance to remove the jumper installed per step 11.2 when the jumper is no longer required. ☐
    11.4 Place caution tag stating which input to the alarm is defeated near annunciator window HH1. Caution tag cover sheet shall reference the CR in step 11.3. ☐

References: A-177100, Sh. 386 and 391; U-258242; D-175037, Sh. 3; A-181541, Sh F-H and F-4; U-266647 PLS Document

LOCATION HH2

SETPOINT: 1.25 inches below Normal Level

ORIGIN: 1. Upper Reservoir: Level Switch LS-427
2. Lower Reservoir: Level Switch LS-429

H2
RCP 1B BRG UPPER/LOWER OIL RES LO LVL

PROBABLE CAUSE

1. Sight glass rupture.
2. Oil Leakage.
3. Instrument malfunction.

AUTOMATIC ACTION

NONE

OPERATOR ACTION

1. Continuously monitor RCP 1B bearing temperatures. ☐

NOTE: WHEN transitioning to FNP-1-EEP-0.0 AND at the Shift Supervisors direction, it is ACCEPTABLE for one team member to complete the Immediate Operator Actions of FNP-1-EEP-0.0. While the other team member verifies a Reactor Trip, THEN trips the appropriate RCP(s) before finishing the Immediate Operator Actions of FNP-1-EEP-0.0. (AI 2004200019) ☐

2. IF any 1B RCP motor bearing temperature exceeds 195°F, THEN perform the following actions:
   a) Trip the reactor, AND go to FNP-1-EEP-0.0, REACTOR TRIP OR SAFETY INJECTION. ☐
   b) Stop 1B RCP. ☐
   c) Perform the actions required by FNP-1-AOP-4.0, LOSS OF REACTOR COOLANT FLOW. ☐
   d) Manually close pressurizer spray valve, PK 444D. ☐
3. Generate a condition report to document the time of the initial alarm. ☐
4. Start an admin tracking sheet to document anytime the alarm clears and for any future alarms. ☐

NOTE: The intent of the following step is to observe if the alarm will initially clear, and to monitor how long the alarm will stay clear. This should give some indication of the leak magnitude. ☐

It is not intended to continuously raise CCW temperature to it maximum limit to keep the alarm clear. (CR2003003074) ☐

5. Initially raise CCW temperature 5°F and to try and clear the alarm ☐
6. At the direction of the Operations Manager, reduce power as necessary to permit a containment entry. ☐
7. As soon as practical make a containment entry to determine the cause for the bearing oil reservoir low level and the extent of any damage. ☐
8. IF instrument malfunction was the cause of the alarm, THEN perform the following actions:
   a) Notify appropriate personnel. ☐
   b) Determine the cause and correct the instrument fault. ☐
   c) Return the instrument to normal as soon as possible. ☐
9. Correct the cause and any damage that has resulted. ☐
10. Return the Reactor Coolant Pump to service as soon as possible.
11. IF the cause of the alarm can NOT be corrected AND a determination has been made to continue operating, THEN perform the following:
    11.1 Monitor the following parameters at an increased frequency to be determined by the Operations Shift Manager:
    11.1.1 CCW Surge Tank Level ☐
    11.1.2 1B RCP bearing temperatures ☐
    11.2 Initiate a CR for Maintenance to defeat the input from LS-427 or LS-429 to restore alarm capability for the LS that is not causing the alarm by jumpering the appropriate terminals in annunciator cabinet "1D" N1H25L040D-N per the following: ☐

RESERVOIR	LEVEL SWITCH	TERMINALS	DRAWING A177100
Upper	N1B41LS0427	SP-43A (H62C) SP-43B (H62D)	Sh. 392 & 387
Lower	N1B41LS0429	SP-43B (H72C) SP-43C (H72D)	Sh. 392

    11.3 Initiate a second CR for Maintenance to remove the jumper installed per step 11.2 when the jumper is no longer required. ☐
    11.4 Place caution tag stating which input to the alarm is defeated near annunciator window HH2. Caution tag cover sheet shall reference the CR in step 11.3. ☐

References: A-177100, Sh. 387 and 392; U-258242; D-175036, Sh. 3; A-181541, Sh. F-H and F-4; U-266647 PLS Document

LOCATION HH3

SETPOINT: 1.25 inches below Normal Level

ORIGIN: 1. Upper Reservoir: Level Switch LS-437
2. Lower Reservoir: Level Switch LS-439

H3
RCP 1C BRG UPPER/LOWER OIL RES LO LVL

PROBABLE CAUSE

1. Sight glass rupture.
2. Oil Leakage.
3. Instrument malfunction.

AUTOMATIC ACTION

NONE

OPERATOR ACTION

1. Continuously monitor RCP 1C bearing temperatures. ☐

NOTE: WHEN transitioning to FNP-1-EEP-0.0 AND at the Shift Supervisors direction, it is ACCEPTABLE for one team member to complete the Immediate Operator Actions of FNP-1-EEP-0.0. While the other team member verifies a Reactor Trip, THEN trips the appropriate RCP(s) before finishing the Immediate Operator Actions of FNP-1-EEP-0.0. (AI 2004200019) ☐

2. IF any 1C RCP motor bearing temperature exceeds 195°F, THEN perform the following actions:
   a) Trip the reactor, AND go to FNP-1-EEP-0.0, REACTOR TRIP OR SAFETY INJECTION. ☐
   b) Stop 1C RCP. ☐
   c) Perform the actions required by FNP-1-AOP-4.0, LOSS OF REACTOR COOLANT FLOW. ☐
3. Generate a condition report to document the time of the initial alarm. ☐
4. Start an admin tracking sheet to document anytime the alarm clears and for any future alarms. ☐

NOTE: The intent of the following step is to observe if the alarm will initially clear, and to monitor how long the alarm will stay clear. This should give some indication of the leak magnitude. ☐

It is not intended to continuously raise CCW temperature to it maximum limit to keep the alarm clear. (CR2003003074) ☐

5. Initially raise CCW temperature 5°F and to try and clear the alarm ☐
6. At the direction of the Operations Manager, reduce power as necessary to permit a containment entry. ☐
7. As soon as practical make a containment entry to determine the cause for the bearing oil reservoir low level and the extent of any damage. ☐
8. IF instrument malfunction was the cause of the alarm, THEN perform the following actions:
   a) Notify appropriate personnel. ☐
   b) Determine the cause and correct the instrument fault. ☐
   c) Return the instrument to normal as soon as possible. ☐
9. Correct the cause and any damage that has resulted. ☐
10. Return the Reactor Coolant Pump to service as soon as possible. ☐
11. IF the cause of the alarm can NOT be corrected AND a determination has been made to continue operating, THEN perform the following:
    11.1 Monitor the following parameters at an increased frequency to be determined by the Operations Shift Manager:
    11.1.1 CCW Surge Tank Level ☐
    11.1.2 1C RCP bearing temperatures ☐
    11.2 Initiate a CR for Maintenance to defeat the input from LS-437 or LS-439 to restore alarm capability for the LS that is not causing the alarm by jumpering the appropriate terminals in annunciator cabinet "1D" N1H25L040D-N per the following: ☐

RESERVOIR	LEVEL SWITCH	TERMINALS	DRAWING A177100
Upper	N1B41LS0437	SP-45A (H63C) SP-45B (H63D)	Sh. 393 & 388
Lower	N1B41LS0439	SP-45B (H73C) SP-45C (H73D)	Sh. 393

    11.3 Initiate a second CR for Maintenance to remove the jumper installed per step 11.2 when the jumper is no longer required. ☐
    11.4 Place caution tag stating which input to the alarm is defeated near annunciator window HH3. Caution tag cover sheet shall reference the CR in step 11.3 ☐

References: A-177100, Sh. 388 and 393; U-258242; D-175037, Sh. 3; A-181541, Sh. F-H and F-4; U-266647 PLS Document

LOCATION HH4

SETPOINT: Shaft Vibration - 15 mils
Frame Vibration - 3 mils
(4 for RCP 1A; 3.3 for RCP 1C)

ORIGIN: Bently Nevada Series 3300 Vibration Monitoring Equipment. (139′ Elec. Pen. Rm.)

H4
RCP VIB TRBL

PROBABLE CAUSE

1. Pump damage.
2. Loss of NPSH.
3. Instrument malfunction.

AUTOMATIC ACTION

NONE

OPERATOR ACTION

1. Monitor RCS flow, subcooling conditions and RCP run current to determine if low NPSH conditions exist. ☐
2. Monitor seal injection flow to insure a seal problem is not causing the increased vibration. ☐
3. Monitor RCP bearing temperatures. ☐
4. Dispatch appropriate personnel to the 139' EPR to observe vibration monitoring equipment to determine affected pump, vibration level, and rate of increase. ☐
5. IF Westinghouse has not been previously notified of an abnormal vibration on a RCP, THEN notify Westinghouse of the RCP vibration. (Ref. Westinghouse Infogram IG95008A) ☐

NOTE:
- **For a gradual increase where plant management and Westinghouse have been able to consult, the guidance in the following steps may be altered per plant management direction.** ☐
- **The guidance in the following steps is N/A if an obvious instrument malfunction has resulted in this alarm.** ☐
- **WHEN transitioning to FNP-1-EEP-0.0 AND at the Shift Supervisors direction, it is ACCEPTABLE for one team member to complete the Immediate Operator Actions of FNP-1-EEP-0.0. While the other team member verifies a Reactor Trip, THEN trips the appropriate RCP(s) before finishing the Immediate Operator Actions of FNP-1-EEP-0.0. (AI 2004200019)** ☐

6. IF shaft vibration is ≥ 15 MILS AND the rate of increase in vibration exceeds 1 MIL per hour OR shaft vibration under any conditions exceeds 20 MILS, THEN perform the following:

OPERATOR ACTION (cont.)

6.1 Trip the reactor, AND go to FNP-1-EEP-0.0, REACTOR TRIP OR SAFETY INJECTION. ☐
6.2 Stop the affected RCP. ☐
6.3 Perform the actions required by FNP-1-AOP-4.0, LOSS OF REACTOR COOLANT FLOW, as applicable. ☐

CAUTION: Operation of the RCP at frame vibration levels above 5 MILS could result in RCP internal and/or attached piping damage. ☐

7. IF frame vibration reaches the 5 MIL limit, without an excessive rate of increase, THEN preparations for an orderly plant shutdown should begin, pending a management and Westinghouse review of the vibration.
   7.1 IF frame vibration has reached 5 MILS and the rate of increase exceeds 0.2 MIL per hour, THEN perform the following:

NOTE: WHEN transitioning to FNP-1-EEP-0.0 AND at the Shift Supervisors direction, it is ACCEPTABLE for one team member to complete the Immediate Operator Actions of FNP-1-EEP-0.0. While the other team member verifies a Reactor Trip, THEN trips the appropriate RCP(s) before finishing the Immediate Operator Actions of FNP-1-EEP-0.0. (AI 2004200019) ☐

   7.1.1 Trip the reactor, AND go to FNP-1-EEP-0.0, REACTOR TRIP OR SAFETY INJECTION. ☐
   7.1.2 Stop the affected RCP ☐
   7.1.3 Perform the actions required by FNP-1-AOP-4.0, LOSS OF REACTOR COOLANT FLOW, as applicable. ☐

8. WHEN vibration levels are below setpoint AND it is desired to reset the vibration alarm at the Bently Nevada panel, THEN perform the following:
   8.1 Depress the RESET pushbutton located on the front of the System Monitor module. ☐
   8.2 Check individual vibration monitor module alarms have reset. ☐

References: A-177100, Sh. 394; PCN 80-707; PCN B87-1-4230; PCN B90-1-6387; U-214849; Westinghouse Letter ALA-96-0574, U-266375

LOCATION HH5

SETPOINT: Ambient + 50°F

ORIGIN: Temperature Bistable TB-401 from Temperature Element TE-401

H5
RX VESSEL FLANGE LKOF TEMP HI

PROBABLE CAUSE

1. Leakage past O-Ring Seal on Reactor Vessel Flange.
2. Instrument malfunction.

AUTOMATIC ACTION

NONE

OPERATOR ACTION

1. Determine the actual reactor vessel flange leakoff temperature as indicated by TI-401, on the MCB. ☐
2. Perform the following to determine if actual flange leakage exists:
   - Compare indicated flange leakoff temperature with containment temperature. ☐
   - Monitor RCDT pressure for increasing trend. ☐
   - Monitor RCDT level for increasing trend. ☐
3. IF reactor vessel flange leakage is indicated, THEN CLOSE RX VESSEL LKOF ISO Q1B13HV8032. ☐
4. Refer to Technical Specifications 3.4.13 for LCO requirements on operational leakage. ☐
5. At the earliest opportunity, make a containment entry and determine if one or both seal rings are leaking. ☐

References: A-177100, Sh. 395; D-175037, Sh. 1; U-266647 PLS Document; Technical Specifications.

jpm e

CRO-406B MOD

TITLE: Verify Phase B Containment Isolation And Containment Spray Initiation

PROGRAM APPLICABLE: SOT ___ SOCT ___ OLT _X_ LOCT ____

ACCEPTABLE EVALUATION METHOD: _X_ PERFORM ___ SIMULATE ___ DISCUSS

EVALUATION LOCATION: _X_ SIMULATOR ___ CONTROL ROOM ___ PLANT

PROJECTED TIME: 10 MIN SIMULATOR IC NUMBER: IC-215 (Base -073)

ALTERNATE PATH _X_ TIME CRITICAL ___ PRA _X_

JPM DIRECTIONS:

1. Examinee will obtain all references from the simulator.
2. The actions of this task are intended to be performed on an Active Simulator in which the examinee may diagnose the correctness of system response to his/her actions and respond to any abnormal conditions which may arise.
3. Provide student with HANDOUT.
4. Allow student time to review control board.
5. Instructor will be provided to address alarms not related to evaluated task.

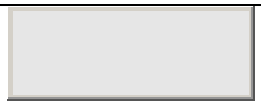
TASK STANDARD: Upon successful completion of this JPM, the examinee will:

1. Verify Phase B Containment Isolation and PRF start.

Examinee:		
Overall JPM Performance:	**Satisfactory** ☐	**Unsatisfactory** ☐
Evaluator Comments (attach additional sheets if necessary)		

EXAMINER: _____

Developer	S Jackson	Date: 4/8/15
NRC Approval	SEE NUREG 1021 FORM ES-301-3	

EVENT DESCRIPTION	ACTION	DETAILS
Reset into IC- 215		
Reset into IC-73 inserted faults and ran a LOCA until desired starting point reached.		
Acknowledge computer alarms		
Run / Freeze Simulator		
Acknowledge Alarms		
Turn Horns ON		
Run / Freeze Simulator		

CONDITIONS

When I tell you to begin, you are to PERFORM THE ACTIONS OF EEP-0.0, REACTOR TRIP OR SAFETY INJECTION. The conditions under which this task is to be performed are:

a. A LOCA has occurred.
b. EEP-0 steps 1 through 5 are complete.
c. You are directed continue with step 6 of EEP-0.0
d. A pre-job brief is not required.

EVALUATION CHECKLIST

	ELEMENTS:	STANDARDS:	RESULTS: (CIRCLE)
	_____ START TIME		
1.	6 [CA] Check containment pressure - HAS REMAINED LESS THAN 27 psig. CTMT PRESS [] PR 950	Observes Containment pressure has NOT remained less than 27 psig and proceeds to 6 (RNO).	S / U
*2.	6.1 (RNO) Verify PHASE B CTMT ISO - ACTUATED. [] MLB-3 1-1 lit [] MLB-3 6-1 lit	Observes MLB-3 1-1/6-1 NOT LIT and Takes both CS/PH B HS's to Actuate. Observes MLB-3 1-1/6-1 lit but not all valves actuate (See ELEMENT 4 below).	S / U
*3.	6.2 (RNO) Stop all RCPs RCP [] 1A [] 1B [] 1C	Take HS's for 1A, 1B & 1C RCPs to stop. Observes greenlights lit, red lights out, 0 amps and loop flow falling.	S / U

EVALUATION CHECKLIST

ELEMENTS:		STANDARDS:	RESULTS: (CIRCLE)
	Note: Applicant may try the CS handswitches again which will produce no additional help.		
	Note: MLB-3: 4-3 and 9-3, 1A and 1B PRF RECIRC DAMPER, will be closed (green light lit, red and white lights not lit) until they modulate open to limit Penetration room pressure to > -2 IN WC.		
4.	6.3.1 (RNO) Check All MLB-3 lights lit.	Checks MLB-3 lights & observes all light lit except: NOT lit: 1-2, 3-2, 4-1, 4-3, 8-2, 9-1, 9-3	S / U
	NOTE: This begins the ALTERNATE PATH.		
5.	6.3.2 (RNO) IF any MLB-3 light NOT lit, THEN verify PHASE B CTMT ISO using ATTACHMENT 5, PHASE B CONTAINMENT ISOLATION.	Proceeds to Attachment 5	S / U
	NOTE: The order of performance of the following elements is not critical. Step 1 of Attachment 5 directs the verification of associated component status for light not lit. The applicant may open MOV-3361A and B if they are not modulated open at this time.		
*6.	Close Q1P19HV3611, IA TO CTMT	(BOP) HS for HV-3611 taken to close. Observes green light lit, red light out, MLB-3, 1-2 lit.	S / U
	Note: Performing EITHER element 7 or 8 satisfies success criteria for having ONE train of CCW from the Thermal Barrier isolated.		
*7.	Close Q1P17HV3045, CCW FROM RCP THRM BARR	HS for HV-3045 taken to close. Observes green light lit, red light out, MLB-3, 3-3 lit.	S / U
*8.	Close Q1P17HV3184, CCW FROM RCP THRM BARR	HS for HV-3184 taken to close. Observes green light lit, red light out, MLB-3, 8-1 lit.	S / U

EVALUATION CHECKLIST

ELEMENTS:	STANDARDS:	RESULTS: (CIRCLE)
Note: Starting either 1A or 1B PRF EXH fan satisfies success criteria for having ONE train of PRF on service.		
*9. Starts Q1E15M001A, 1A PRF EXH FAN	HS for 1A PRF EXH FAN taken to START and released when red light is lit and green light is out.	S / U
*10. Starts Q1E15M001B, 1B PRF EXH FAN	HS for 1A PRF EXH FAN taken to START and released when red light is lit and green light is out.	S / U

_____ STOP TIME

Terminate when all Elements are complete.

CRITICAL ELEMENTS: Critical Elements are denoted by an asterisk (*) before the element number.

GENERAL REFERENCES:

1. FNP-1-EEP-0.0, ver 46
2. PRA/IPE Human Reliability Analysis Notebook operator actions 3.6.10 and 3.6.11
3. K/As: WE14EA1.1 – 3.7 / 3.7
   103A3.01 – 3.9 / 4.2

GENERAL TOOLS AND EQUIPMENT:

1. Provide a copy of FNP-1-EEP-0.0, ver 46

Critical ELEMENT justification:

1	Not critical – Check step
2	Critical – Starts Containment Spray.
3	Critical – Prevents RCP damage.
4-5	Not critical – No actions taken.
6	Critical- Isolates Containment.
7 or 8	Critical- Isolates Containment.
9 or 10	Critical – Allows proper filtration of any penetration room leakage.

COMMENTS:

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CONDITIONS

When I tell you to begin, you are to PERFORM THE ACTIONS OF EEP-0.0, REACTOR TRIP OR SAFETY INJECTION. The conditions under which this task is to be performed are:

a. A LOCA has occurred.
b. EEP-0 steps 1 through 5 are complete.
c. You are directed continue with step 6 of EEP-0.0
d. A pre-job brief is not required.

Step	Action/Expected Response	Response NOT Obtained
___ 5	Verify actuation signal automatic actions using ATTACHMENT 2, AUTOMATIC ACTIONS VERIFICATION.	

NOTE: Step 6 is a continuing action step while in this procedure.

___ 6	[CA] Check containment pressure - HAS REMAINED LESS THAN 27 psig. CTMT PRESS [] PR 950	6 Perform the following. 6.1 Verify PHASE B CTMT ISO - ACTUATED. [] MLB-3 1-1 lit [] MLB-3 6-1 lit 6.2 Stop all RCPs. RCP [] 1A [] 1B [] 1C 6.3 Verify PHASE B CTMT ISO alignment. 6.3.1 Check All MLB-3 lights lit. 6.3.2 IF any MLB-3 light NOT lit, THEN verify PHASE B CTMT ISO using ATTACHMENT 5, PHASE B CONTAINMENT ISOLATION.

Step 6 continued on next page.

Step	Action/Expected Response	Response NOT Obtained
		6.4 Check containment spray. 6.4.1 Check containment spray flow in both trains greater than 0 gpm. CS FLOW [] FI 958A [] FI 958B 6.4.2 IF containment spray flow in both trains NOT greater than 0 gpm, THEN verify containment spray pump suction valves open. RWST TO 1A(1B) CS PUMP [] Q1E13MOV8817A [] Q1E13MOV8817B 6.4.3 IF unable to establish spray flow in a train, THEN secure containment spray pump in affected train. [] CS RESET TRN A(B) containment spray signals – RESET (Annunciator EE4 clear). [] CTMT SPRAY PUMP 1A(B) – STOPPED in affected train
___ 7	Announce "Unit 1 reactor trip and safety injection."	

Step	Action/Expected Response	Response NOT Obtained

ATTACHMENT 5

PHASE B CONTAINMENT ISOLATION

NOTE:
- ATTACHMENT 5, FIGURE 1 provides a listing of component names corresponding to each MLB–3 location.
- ATTACHMENT 9 provides a listing of sequenced loads.
- Position of dampers 3361A (B) is dependent on penetration room pressure/inleakage, and may not be open in all cases.
- IF PRF has been aligned in the post–LOCA mode per FNP–1–SOP–60.0, PENETRATION ROOM FILTRATION SYSTEM, THEN only one train of equipment may be in operation.

1 Check all the following MLB–3 indicating lights lit.

1 Verify associated component status.

	1	2	3	4	5	6	7	8	9	10
1	CTMT ISO PHASE B	CS PMP 1A ON	3052 CLOSED	PENE RM EXH FAN 1A ON		CTMT ISO PHASE B	CS PMP 1B ON	3046 CLOSED	PENE RM EXH FAN 1B ON	
2	3611 CLOSED	CS RM CLR 1A ON	3045 CLOSED	PENE RM RECIRC FAN 1A ON		2228 CLOSED	CS RM CLR 1B ON	3184 CLOSED	PENE RM RECIRC FAN 1B ON	
3		8820A OPEN	3182 CLOSED	3361A OPEN			8820B OPEN		3361B OPEN	
4				3362A OPEN					3362B OPEN	

2 Verify proper PRF system operation using FNP–1–SOP–60.0, PENETRATION ROOM FILTRATION SYSTEM.

3 Notify control room of phase B containment isolation status.

-END-

ATTACHMENT 5

FIGURE 1

LOCATION	COMPONENT NUMBER	NAME
1-1	N/A	CTMT ISO PHASE B - ACTUATED
1-2	Q1P19HV3611	IA TO CTMT (BOP) - CLOSED
1-3	N/A	SPARE
1-4	N/A	SPARE
2-1	Q1E13P001A	1A CS PUMP - ON
2-2	Q1E16M002A	1A CS PUMP RM CLR FAN (BOP) - ON
2-3	Q1E13MOV8820A	1A CS PUMP TO SPRAY HDR ISO - OPEN
2-4	N/A	SPARE
3-1	Q1P17MOV3052	CCW TO RCP CLRS - CLOSED
3-2	Q1P17HV3045	CCW FROM RCP THRM BARR - CLOSED
3-3	Q1P17MOV3182	CCW FROM RCP OIL CLRS - CLOSED
3-4	N/A	SPARE
4-1	Q1E15M001A	1A PRF EXH FAN - ON
4-2	Q1E15M002A	1A PRF RECIRC FAN - ON
4-3	Q1E15MOV3361A	1A PRF RECIRC FAN RECIRC DMPR - OPEN
4-4	Q1E15MOV3362A	1A PRF SUCTION DMPR - OPEN
5-1	N/A	SPARE
5-2	N/A	SPARE
5-3	N/A	SPARE
5-4	N/A	SPARE
6-1	N/A	CTMT ISO PHASE B - ACTUATED
6-2	Q1P19HV2228	PORV BKUP AIR SUPPLY (PRIP) - CLOSED
6-3	N/A	SPARE
6-4	N/A	SPARE

ATTACHMENT 5

FIGURE 1

LOCATION	COMPONENT NUMBER	NAME
7-1	Q1E13P001B	1B CS PUMP - ON
7-2	Q1E16M002B	1B CS PUMP RM CLR FAN (BOP) - ON
7-3	Q1E13MOV8820B	1B CS PUMP TO SPRAY HDR ISO - OPEN
7-4	N/A	SPARE
8-1	Q1P17MOV3046	CCW FROM RCP OIL CLRS - CLOSED
8-2	Q1P17HV3184	CCW FROM RCP THRM BARR - CLOSED
8-3	N/A	SPARE
8-4	N/A	SPARE
9-1	Q1E15M001B	1B PRF EXH FAN - ON
9-2	Q1E15M002B	1B PRF RECIRC FAN - ON
9-3	Q1E15MOV3361B	1B PRF RECIRC FAN RECIRC DMPR - OPEN
9-4	Q1E15MOV3362B	1B PRF SUCTION DMPR - OPEN
10-1	N/A	SPARE
10-2	N/A	SPARE
10-3	N/A	SPARE
10-4	N/A	SPARE

jpm f

CRO-NEW

TITLE: Place The Standby CCW Hx On Service On "A" Train

PROGRAM APPLICABLE: SOT ___ SOCT ___ OLT _X_ LOCT ___

ACCEPTABLE EVALUATION METHOD: _X_ PERFORM ___ SIMULATE ___ DISCUSS

EVALUATION LOCATION: _X_ SIMULATOR __ CONTROL ROOM ___ PLANT

PROJECTED TIME: _10 MIN_ SIMULATOR IC NUMBER: IC-216 (Base -12)

ALTERNATE PATH ___ TIME CRITICAL ___ PRA

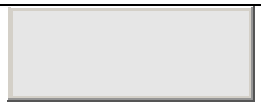
JPM DIRECTIONS:

1. Examinee will obtain all references from the simulator.
2. The actions of this task are intended to be performed on an Active Simulator in which the examinee may diagnose the correctness of system response to his/her actions and respond to any abnormal conditions which may arise.
3. Provide student with HANDOUT.
4. Allow student time to review control board.
5. Instructor will be provided to address alarms not related to evaluated task.

TASK STANDARD: Upon successful completion of this JPM, the examinee will:

1. Respond to a loss of the On Service CCW train in Mode 3.

Examinee:		
Overall JPM Performance:	**Satisfactory** ☐	**Unsatisfactory** ☐
Evaluator Comments (attach additional sheets if necessary)		

EVENT DESCRIPTION	ACTION	DETAILS
Reset into IC-216		
Acknowledge computer alarms		
Run / Freeze Simulator		
Acknowledge Alarms		
Turn Horns ON		
Run / Freeze Simulator		

CONDITIONS

When I tell you to begin, you are to PLACE THE STANDBY CCW HX ON SERVICE ON "A" TRAIN. The conditions under which this task is to be performed are:

a. The plant is in Mode 3.
b. 'A' TRAIN is the ON-SERVICE TRAIN.
c. 1B CCW Hx is on service and the 1C CCW Hx is aligned for standby operation on the 'A' train per SOP-23.0C.
d. You are directed to swap the on service 'A' Train CCW HX from the 1B Hx to the 1C Hx per SOP-23.0

EVALUATION CHECKLIST

	ELEMENTS:	**STANDARDS:**	**RESULTS: (CIRCLE)**
	_____ START TIME		
1.	4.4.1 Ensure 1B CCW HX is aligned to the A Train CCW and A Train SW per Appendix 23.0C.	This is in the initial conditions. If the applicant asks the SS (CUE: 1B CCW HX is aligned to the A Train CCW and A Train SW per Appendix 23.0C	S / U
2.	4.4.2 Verify SW FROM 1C CCW HX Q1P16FV3009C handswitch is in MOD.	Observes Q1P16FV3009C handswitch is in MOD	S / U
3.	4.4.3 Verify 1C CCW HX DISCH FCV HIC 3009C is demanding the valve to be fully closed (100% demand).	Observes 1C CCW HX DISCH FCV HIC 3009C is at the top of the scale – 100%	S / U
4.	4.4.4. Locally verify closed SW FROM 1C CCW HX Q1P16FV3009C.	Calls SO to locally verify Q1P16FV3009C closed. (CUE: Q1P16FV3009C is closed)	S / U

Note: When MOV3130C opens it will trigger the tripping of the 1C CCW pump. This begins the alternate path.

5.	4.4.5 Open SW TO 1C CCW HX Q1P16MOV3130C.	MOV3130C handswitch is taken to open. Red light lights and green light is out.	S / U

Note: The steps below are from AA3 Operator Action.

6.	1 Check 1C CCW PUMP has tripped	Observes the green and amber light lit and red light out for 1C CCW pump	S / U

EVALUATION CHECKLIST

	ELEMENTS:	STANDARDS:	RESULTS: (CIRCLE)
7.	2 Verify standby pump running, if aligned to affected train.	Takes 1B CCW pump switch to START, green light stays lit and red light stays out.	S / U
8.	3 Perform the actions required by FNP-1-AOP-9.0, LOSS OF COMPONENT COOLING WATER.	Proceeds to AOP-9	S / U

Note: The following steps are from AOP-9.0, Loss of Component Cooling Water.

9.	1 Verify CCW pump started in affected train.	Takes 1B CCW pump switch to START, green light stays lit and red light stays out.	S / U
10.	1.1 (RNO) Verify CCW pump started in the non-affected train.	Observes 1A CCW pump red light lit and green light.	S / U
*11.	1.2 (RNO) IF CCW pump running in non-affected train, THEN start charging pump in non-affected train.	Takes the 1C Charging pump HS to the START position then release and observes the red light lit and green light out with amps indicated.	S / U
*12.	1.3 (RNO) IF charging pump started in non-affected train, THEN stop charging pump in affected train.	Takes 1A Charging pump HS to the STOP position then release and observes green light lit and red light out with zero amps.	S / U

Note: The RCP bearing temperatures may exceed 195°F by this time.

13.	2 [CA] Check cooling adequate for continued plant support. • Check CCW flow adequate in affected train.	Observes no CCW pumps are running in the A train.	S / U
	2.1(RNO) IF the ON SERVICE train is affected, THEN perform the following:	On service train is affected	

EVALUATION CHECKLIST

ELEMENTS:		STANDARDS:	RESULTS: (CIRCLE)
14.	2.1.1 (RNO) IF the reactor is critical, THEN trip the reactor and perform, FNP-1-EEP-0, REACTOR TRIP OR SAFETY INJECTION, while continuing with this procedure.	This step is N/A	S / U
*15.	2.1.2 (RNO) Verify all Reactor Coolant pumps stopped.	Takes the 1A, 1B and 1C RCP HS's to STOP then release and observes green lights lit and red lights out with zero amps on all 3 RCPs and falling flow on all 3 loops.	S / U
16.	2.1.3 (RNO) IF in Mode 3 or 4, THEN perform FNP-1-AOP-4.0, LOSS OF REACTOR COOLANT FLOW while continuing with procedure.	Goes to AOP-4.0	S / U

Note: the steps below are from AOP-4.0, Loss of Reactor Coolant Flow and are Immediate Actions

17.	1 Check 1A and 1B RCPs - RUNNING.	Observes ALL RCPs – green lights lit and red lights out	S / U
18.	1 (RNO) Manually close pressurizer spray valve for affected RCP. [ ] 1A RCS loop spary valve PK-444C [ ] 1B RCS loop spray valve PK-444D	Depresses the 'LOWER' demand button for PK-444C and PK-444D until demand = 0.	S/U
19.	2 [CA] Maintain SG narrow range level stable at approximately 65% using: [ ] Auxiliary Feedwater Control Valves.	Adjusts HIC 3227AA, 3227BA and 3227CA MDAWFP TO 1A,1B, 1C SG FLOW CONT to maintain SG water level. Applicant may isolate AFW to the SGs	S / U

_____ STOP TIME

Terminate when the Immediate Actions of AOP-4.0 are complete.

CRITICAL ELEMENTS: Critical Elements are denoted with an asterisk (*) before the element number.

GENERAL REFERENCES

1. FNP-1-SOP-23.0, ver 94.2
2. FNP-1-ARP-1.1, ver 55.1
3. FNP-1-AOP-9.0, ver 25
4. FNP-1-AOP-4.0, ver 19
5. K/As: 008A2.01 - 3.3 / 3.6
   026AA1.02 - 3.2 / 3.3

GENERAL TOOLS AND EQUIPMENT

1. FNP-1-SOP-23.0, ver 94.2
2. FNP-1-ARP-1.1, ver 55.1
3. FNP-1-AOP-9.0, ver 25
4. FNP-1-AOP-4.0, ver 19

Critical ELEMENT justification:

1 – 4	Not critical – Check steps.
5	Not critical – Does not affect actions of AOP-9.0.
6	Not critical – Check step.
7	Not critical – Pump does not start.
8	Not critical – No action required.
9	Not critical – Pump does not start.
10	Not critical – No action required.
11	Critical – Maintains seal injection and Pressurizer level.
12	Critical – Prevent Damage to the Charging pump.
13	Not critical – Check step.
14	Not critical – Step is N/A
15	Critical – Prevent Damage to the RCP's
16	Not critical – No operator action.
17	Not critical – Check step.
18	Not critical – with no RCPs running there is no negative impact on pressure control.
19	Not critical – SG overfill did not occur in twice the validation time.

COMMENTS

jpm f

CONDITIONS

When I tell you to begin, you are to PLACE THE STANDBY CCW HX ON SERVICE ON "A" TRAIN. The conditions under which this task is to be performed are:

a. The plant is in Mode 3.
b. 'A' TRAIN is the ON-SERVICE TRAIN.
c. 1B CCW Hx is on service and the 1C CCW Hx is aligned for standby operation on the 'A' train per SOP-23.0C.
d. You are directed to swap the on service 'A' Train CCW HX from the 1B Hx to the 1C Hx per SOP-23.0

SAFETY RELATED

COMPONENT COOLING WATER SYSTEM

PROCEDURE LEVEL OF USE CLASSIFICATION PER NMP-AP-003	
CATEGORY	**SECTIONS**
Continuous:	**ALL**
Reference:	**NONE**
Information:	**NONE**

Approved:

David L Reed (for)
Operations Manager

02/17/2014
Effective Date

Procedure Version Description

Version Number	Version Description
91.1	Added checkboxes to notes & cautions. Corrected referenced step contained in App. 7, step 4.30. CR 396287
91.2	Deleted reference to FNP-1-SOP-54.0 P&L 3.19.2 from step 2.18.3 due to same information is available in step 2.18.2. CR433685
92.0	CR - 435885, TE361447 - Revised order of App 13 steps 4.2.5 thru 4.2.8 per CR/TE – brc
92.1	● CR 448381 – Added P&L 2.38 to specify special PPE requirements while handling potassium chromate. ● CR 358592 – Added step 3.4.1 to Appendix 23.0B and 23.0C to provide a conditional statement to check the in service CCW HX.
93.0	Added figures 1 & 2. Deleted CV requirement from numerous steps that no longer meet the definition requiring CV.
93.1	Added P&L 2.39 for CCW processing time limits per CR 609985 Relocated Disconnect Figures To Appendix s CR # 641637
94.0	Implemented changes to support DCP SNC 66497.
94.1	Per CR703187, added steps to enhance CCW drum processing. Revised the procedure to include the appropriate records section
94.2	Added information that minimum recirc time for chemical mixing is 72 hours. CR 769516

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1.0 Purpose

This procedure provides Initial Conditions, Precautions and Limitations, and Instructions for operation of the Component Cooling Water System (CCW).

2.0 PRECAUTIONS AND LIMITATIONS

2.1 At least two independent component cooling water loops shall be OPERABLE while in operational modes 1, 2, 3, and 4.

2.2 CCW is normally lined up so that

- One CCW pump and one CCW heat exchanger is in operation supplying the on-service train and the secondary heat exchangers.
- The remaining pump and heat exchanger are valved into a closed loop with the redundant safety train. The off-service train is normally in operation in modes 1–4 supplying the operating charging pump, with the non-operating SFP HX flowpath aligned and CCW to the RHR HX isolated. (Reference RER 1080944901)

2.3 Control circuitry does not allow auto start of two pumps in the same train. In order for 1B CCW pump to be started by the ESS or LOSP sequencers; the train to which it is aligned must have the train dedicated pump supply breaker racked out.

2.4 In order to maintain a train operable with the dedicated pump/breaker inoperable AND racked in, the cell switch should be jumpered for the swing breaker to ensure the swing breaker will close on an auto start signal with the dedicated pump breaker racked in. Additionally, a link should be opened in the autostart circuitry of the dedicated pump to prevent an autostart of the dedicated train breaker. This arrangement should remain in place until such time the dedicated breaker is declared operable or surveillance testing is started. (AI 2008205335)

2.5 Do not operate more than one CCW pump through one CCW heat exchanger.

2.6 During normal operation of an operating train, component cooling heat exchanger outlet temperature should be maintained between 60°F and 105°F. (CR 2004000155)

2.7 If the CCW HX outlet temperature is maintained below 60°F for extended periods of time and is supplying cooling to the SECURED charging pump, then notify ES and begin sampling the Charging Pump oil for water and contaminants twice per month (reference Westinghouse Letter BPC-88-549). (AI 2009200595)

2.8 The following is required during plant cooldown

- Component cooling water outlet temperature should not exceed 120°F.
- The off-service train is to be used for RHR.

2.9 Frequent starting may damage the component cooling water pump motors. Limit pump starts as follows:

- Two successive starts from ambient temperature.
- One start from rated temperature.
- Subsequent starts: allow 30 minutes running time or 60 minutes idle time between starts.

2.10 The off-service train CCW pump must be running before starting the off-service train charging pump or RHR pump.

2.11 When the off-service CCW train is not in operation, the off-service train RHR Heat Exchange supply MOV should be maintained open to prevent lifting CCW system relief valves on pump auto starts.

- CCW TO 1A RHR HX Q1P17MOV3185A
- CCW TO 1B RHR HX Q1P17MOV3185B

2.12 CCW pump flow should be greater than 2100 gpm.

- If pump flow falls below 2100 gpm, then the flow must be maintained greater than 1000 gpm.
- The time with flow less than 2100 gpm must be limited to less than 100 hours per month. (ABN 97-01080)
- The pump miniflow is sized to pass 1000 gpm.

2.13 If the CCW pump miniflow is closed, such as for in-service testing, then at least 2 of the following 3 flow paths shall be aligned for pump discharge flow.

- The RHR heat exchanger
- The SFP heat exchanger
- The miscellaneous header

This alignment will ensure greater than 2100 gpm flow with allowance for spurious MOV closure (ABN 97-0-1080).

2.14 CCW surge tank level must be maintained above 13 inches.

2.15 Reactor makeup water should only be used as an emergency source of makeup water to the CCW surge tank.

2.16 If the CCW surge tank vents are closed for reasons other than an actual high radiation alarm, then with Shift Supervisor concurrence, the CCW surge tank vents should be cycled once every shift (eight hours) and documented in the Control Room Log.

2.17 The SW FROM CCW HX flow control valves, Q1P16FCV3009A, B & C have mechanical valve travel Open and Close stops.

- The Open Stop for Q1P16FCV3009A is set by the manual handwheel and should not be moved from a nominal setting of 45° open.
- The Open Stop for Q1P16FCV3009C is set by the manual handwheel and should not be moved from a nominal setting of 47° open.
- The Open Stop for Q1P16FCV3009B is set by the manual handwheel and should not be moved from a nominal setting of 47° open.
- If the Open Stop has been moved or one of the Open Stop hex nuts loosened, then a flow test may be required to reset the position of the Open Stop. (DCP-92-2-7928 / DCP 1070138701)

2.18 CCW flow to the SFP HX's should be regulated as follows:

2.18.1 When in Modes 1 – 4, then the CCW outlet valve for the SFP HX should be throttled to limit CCW flow to 1500 gpm through the SFP HX with a RHR HX on service on that train.

2.18.2 If desired to lower SFP temperature while in Modes 5, 6 or defueled, then throttle CCW flow through the on service RHR HX and raise CCW flow in the SFP HX as necessary.

- This special condition will be documented by an admin LCO.
- The limit must be reinstated prior to entering Mode 4.
- The limit is reinstated by establishing CCW flow through the RHR HX and then verifying flow through the SFP HX is ≤ 1500 gpm with that train being the ON SERVICE TRAIN.

2.18.3 When the core is off loaded into the SFP, then CCW flow to the SFP HX should be maintained in accordance with FNP-1-SOP-54.0, Spent Fuel Pit Cooling and PURIFICATION SYSTEM.

2.18.4 CCW flow rates in excess of 3100 gpm through the SFP HX should be avoided. Flows exceeding 3100 gpm for brief periods, such as during performance of STPs is acceptable. (AIT 2002200675)

2.19 IF core offload begins < 140 hours after shutdown, THEN the CCW inlet temperature to the SFP HX should be maintained ≤ 105°F.

2.20 IF core offload begins < 140 hours after shutdown, core offload is prohibited when CCW inlet temperature to the SFP HX exceeds 105°F.

2.21 Service water supply to the standby CCW HX must be closed except when shifting the standby CCW HX. This ensures adequate SW flow is available to the on-service CCW HX and other vital loads in the event of an accident coincident with a loss of air. (AI 2004204513)

2.22 CCW supply valve to SFP heat exchanger must remain open whenever CCW supply valve to RHR heat exchanger in the same train is closed.

2.23 If possible, SFP cooling should be aligned opposite from a train that is carrying both the miscellaneous header and an in-service RHR HX.

2.24 Component cooling water flow to an idle RCP should not be isolated unless reactor coolant system temperature less than 150°F.

2.25 If CCW will be secured to the RCP motor oil coolers for longer than 2 months, then contact Maintenance to have the oil coolers drained and dried per RCP Technical Manual Technical Bulletin 81-02.

2.26 CCW FROM RCP THRM BARR Q1P17HV3184 may experience hydraulic sticking while opening similar to Q1P17HV3045 and Section 4.22 should be used for guidance.

- If this occurs, closely monitor RCP bearing temperatures and seal injection flow.
- When the valve opens verify these parameters return to normal. (CR #2000005361)

2.27 When CCW is to be drained from the system with the intent to reuse, then appropriately labeled and clean 55 gallon two bunghole drums should be obtained from the Storeroom (Main Warehouse) or FAC Group. (CIR 2-94-010)

2.28 All hoses and pumps to be used in draining or pumping reusable CCW should be flushed with demin water before use. (CIR 2-94-010)

2.29 All CCW intended for reuse will be sampled by Chemistry and the sample results obtained prior to placing in the CCW system. (CIR 2-94-010)

2.30 Guidance in this procedure has the potential to impact reactivity. Close coordination with the control room operators is required to ensure proper reactivity management per NMP-OS-001, REACTIVITY MANAGEMENT PROGRAM. (AI 2008203128)

2.31 To eliminate the requirement for Appendix R Kaowool raceway fire barriers for certain raceways in fire areas 2-006 Zone 1 and 2-020, Kaowool Fire Protection Administrative Controls have to be implemented when the swing CCW pump is placed in service for a corresponding dedicated Train pump that is not available. Therefore, when Train A or Train B CCW pump is made unavailable and the swing pump is placed in service on that Train, then the following Kaowool FP administrative controls must be established:

- Begin tracking (e.g., LCO) the amount of time the swing component is in service for the unavailable dedicated Train component.
- If the swing component remains in service for the unavailable dedicated Train component for more than 30 days, then hourly fire watches must be established in the appropriate fire area per FNP-0-SOP-0.4 Table 13 until the unavailable dedicated Train pump is available.

2.32 Pipe internals can be potentially degraded. Proceed with caution. Do not subject vent/drain piping to any undue stress during removal of pipe cap/plug. (AI2009202698).

2.33 Changes to CCW temperature will have an effect on RCP seal leakoff flow rates. If desired to adjust CCW temperature due to RCP seal leakoff flow rate concerns, the guidance in Sections 4.1 and 4.2 concerning adjustment of FCV's 3009 as desired may be used. However, CCW heat exchanger outlet temperature should be maintained between 60°F and 105°F per P&L 2.6.

2.34 While in modes 1-4, both trains of CCW room coolers should not be removed from service at the same time.

2.35 Any operations involving manipulation of the 4kV disconnect switches associated shall include visual confirmation of the following:

2.35.1 The main contacts are in the required state, open or closed. (One contact per phase.) Refer to figure 1 and 2.

2.35.2 The arcing contacts are in the required state, open or closed. (One contact per phase.) Refer to figure 1 and 2.

2.36 To maintain SFP temperature as low as possible during the core off load, consideration should be given to maximizing CCW cooling to the SFP HX(s) early in the fuel transfer to the SFP. Throttle CCW flow to the on service RHR HX(s) as required to maintain appropriate cooling to the on-service train(s) of RHR during core off load. CCW flow rates in excess of 3100 GPM through the SFP HX should be avoided. (1R23 OLL103 CR2010114600)

2.37 When SW is isolated to a CCW HX, (ie, standby heat exchanger), Chemistry shall be notified of the isolated heat exchanger so they may begin monitoring chlorine levels in the idle heat exchanger. (TE 289687)

2.38 Proper personal protection equipment (PPE) must be worn while handling potasium chromate to prevent eye and skin contact. The minimum requirement for PPE is safety glasses with side shields, laboratory coat, and chemical-resistant gloves.

2.39 Notify Chemistry whenever chromated water is drained from a system and drummed. There is a 72 hr. requirement to process the water once the decision has been made to not reuse the water. The NPDES permit requires Chemistry to sample the water during processing, and the samples are shipped off site for various analyses. CCW samples contain Tritium, and must be shipped as radioactive material. There is a 7 day time limit on the total suspended solids analysis, starting at the time the sample is pulled.

3.0 INITIAL CONDITIONS

3.1 The electrical distribution system is energized and aligned for normal operation per FNP-1-SOP-36.0, PLANT ELECTRICAL DISTRIBUTION LINE-UP, with exceptions noted. ☐

3.2 The compressed air system is in normal operation per FNP-1-SOP-31.0, COMPRESSED AIR SYSTEM. ☐

3.3 The component cooling water system valves and electrical distribution systems are aligned per system checklist FNP-1-SOP-23.0A, with exceptions noted. **{CMTs 0008598 & 0008599}** ☐

3.4 The component cooling water system is filled and vented, with the component cooling surge tank filled to a level of approximately 42 inches. ☐

3.5 The service water system is in normal operation per FNP-1-SOP-24.0, SERVICE WATER SYSTEM. ☐

3.6 The demineralized water system and/or the reactor makeup water system is aligned to the component cooling water surge tank per FNP-1-SOP-5.0, DEMINERALIZED MAKEUP WATER SYSTEM, and/or FNP-1-SOP-4.0, REACTOR MAKEUP WATER SYSTEM. ☐

3.7 Radiation monitors R-17A and R-17B are in normal operation per FNP-1-SOP-45.0, RADIATION MONITORING SYSTEM. ☐

4.0 INSTRUCTIONS

4.1 A Train CCW System Startup for Normal Operation

NOTE

If required, then the standby pump may be started in place of the on service pump. ☐

4.1.1 **Verify** 1B CCW pump and 1B CCW HX are aligned to A Train per Appendix 23.0C. ☐

4.1.2 **Check** 1B CCW HX CCW OUTLET ISO, Q1P17V008B is closed. Q1P17V008B may be open if standby heat exchanger in service per Section 4.3 or 4.5. ☐

4.1.3 **Verify** that SW FROM 1C CCW HX Q1P16FV3009C OR SW FROM 1B CCW HX Q1P16FV3009B handswitch is in MOD. ☐

4.1.4 **Throttle** 1C CCW HX DISCH FCV HIC 3009C OR 1B CCW HX DISCH FCV HIC 3009B as necessary to control CCW temperature. ☐

4.1.5 **Verify** on-service CCW HX outlet valve Q1P17V008C or Q1P17V008B open. ☐

4.1.6 **Verify** open CCW TO 1A RHR HX Q1P17MOV3185A. ☐

CAUTION

DO NOT operate more than one CCW pump through one CCW heat exchanger. ☐

4.1.7 **Start** 1C or 1B CCW PUMP. ☐

4.1.8 **Verify** flow increase on FI 3043CA OR BA, for the on-service heat exchanger. ☐

4.1.9 **Monitor** CCW FROM CCW HX TEMP TI 3024C OR TI 3024B to ensure CCW temperature is maintained less than 105°F. ☐

4.1.10 **Monitor** service water header pressure while adjusting HIC 3009C or B. ☐

4.1.11 After system is stable then CCW TO 1A RHR HX Q1P17MOV3185A may be **closed**. ☐

4.2 "B" Train CCW System Startup for Normal Operation

NOTE

IF required, THEN the standby pump may be started in place of the on service pump. ☐

4.2.1 **Verify** 1B CCW pump and 1B CCW HX are aligned to B Train per Appendix 23.0B ☐

4.2.2 **Check** 1B CCW HX CCW OUTLET ISO, Q1P17V008B closed. Q1P17V008B may be open if standby heat exchanger in service per Section 4.4 or 4.6. ☐

4.2.3 **Verify** that SW FROM 1A CCW HX Q1P16FV3009A OR SW FROM 1B CCW HX Q1P16FV3009B handswitch is in MOD. ☐

4.2.4 **Throttle** 1A CCW HX DISCH FCV HIC 3009A OR 1B CCW HX DISCH FCV HIC 3009B as necessary to control CCW temperature. ☐

4.2.5 **Verify** on-service CCW HX outlet valve Q1P17V008A OR Q1P17V008B open. ☐

4.2.6 **Verify** open CCW TO 1B RHR HX Q1P17MOV3185B. ☐

CAUTION

DO NOT operate more than one CCW pump through one CCW heat exchanger. ☐

4.2.7 **Start** 1A OR 1B CCW PUMP. ☐

4.2.8 **Verify** flow increase on FI 3043AA OR BA, for the on-service heat exchanger. ☐

4.2.9 **Monitor** CCW FROM CCW HX TEMP TI3024A or TI3024B to ensure CCW temperature is maintained less than 105°F. ☐

4.2.10 **Monitor** service water header pressure while adjusting HIC 3009A or HIC 3009B ☐

4.2.11 After system is stable then CCW TO 1B RHR HX Q1P17MOV3185B may be **closed**. ☐

4.3 A Train on Service, Shifting to the Standby HX 1B

4.3.1 **Ensure** 1B CCW HX is aligned to the A Train CCW and A Train SW per Appendix 23.0C. ☐

4.3.2 **Verify** SW FROM 1B CCW HX Q1P16FV3009B handswitch is in MOD. ☐

4.3.3 **Verify** 1B CCW HX DISCH FCV HIC 3009B is demanding the valve to be fully closed (100% demand). ☐

4.3.4 Locally **verify** closed SW FROM 1B CCW HX Q1P16FV3009B. ☐

4.3.5 **Open** SW TO 1B CCW HX Q1P16MOV3130B. ☐

4.3.6 **Adjust** 1B CCW HX DISCH FCV, HIC 3009B to obtain approximately 2000 gpm SW flow on FI 3009BA ☐

4.3.7 **Open** 1B CCW HX CCW OUTLET ISO, Q1P17V008B to place 1B CCW HX on service. ☐

4.3.8 **Verify** flow increase on FI 3043BA. ☐

CAUTION

CCW temperature should be maintained as stable as possible to minimize effects on the following:

- Reactivity changes due to changes in letdown temperature
- RCP Oil Levels ☐

4.3.9 **Throttle** open 1B CCW HX DISCH FCV HIC 3009B while throttling closed 1C CCW HX DISCH FCV HIC 3009C

- **Maintain** existing service water pressure. ☐
- **Ensure** CCW temperature is maintained less than 105°F. (120°F if aligned for plant cooldown.) ☐
- Locally **check** 1B CCW HX DISCH FCV 3009B responds to controller demand. (CR 2009107460) ☐

4.3.10 After temperature stabilized with 1B HX on service, **place** 1C CCW HX in Standby by closing 1C CCW HX OUTLET VLV Q1P17V008C. ☐

4.3.11 **Verify** flow on FI 3043CA decreases. ☐

4.3.12 **Verify** 1C CCW HX DISCH FCV HIC 3009C fully closed. ☐

4.3.13 **Close** SW TO 1C CCW HX Q1P16MOV3130C. ☐

NOTE

Opening the breaker in the following step is only required when CCW is required to be operable. Breaker may be left closed in Mode 5 or 6 if an Admin LCO is written to ensure it is opened prior to Mode 4. ☐

4.3.14 **Open** power supply breaker Q1R17BKRFVD5, SW TO 1B CCW HX Q1P16MOV3130B. ☐

4.3.15 **Notify** Chemistry of current alignment of CCW HX's, for monitoring purposes. ☐

4.4 A Train on Service, Shifting to the Standby HX 1C

4.4.1 **Ensure** 1B CCW HX is aligned to the A Train CCW and A Train SW per Appendix 23.0C. ☐

4.4.2 **Verify** SW FROM 1C CCW HX Q1P16FV3009C handswitch is in MOD. ☐

4.4.3 **Verify** 1C CCW HX DISCH FCV HIC 3009C is demanding the valve to be fully closed (100% demand). ☐

4.4.4 Locally **verify** closed SW FROM 1C CCW HX Q1P16FV3009C. ☐

4.4.5 **Open** SW TO 1C CCW HX Q1P16MOV3130C. ☐

4.4.6 **Adjust** 1C CCW HX DISCH FCV, HIC 3009C to obtain approximately 2000 gpm SW flow on FI 3009CA ☐

4.4.7 **Open** 1C CCW HX CCW OUTLET ISO, Q1P17V008C to place 1C CCW HX on service. ☐

4.4.8 **Verify** flow increase on FI 3043CA. ☐

CAUTION

CCW temperature should be maintained as stable as possible to minimize effects on the following:

- Reactivity changes due to changes in letdown temperature
- RCP Oil Levels ☐

4.4.9 **Throttle** open 1C CCW HX DISCH FCV HIC 3009C while throttling closed 1B CCW HX DISCH FCV HIC 3009B.

- **Maintain** existing service water pressure. ☐
- **Ensure** CCW temperature is maintained less than 105°F. (120°F if aligned for plant cooldown.) ☐
- Locally **check** 1C CCW HX DISCH FCV 3009C responds to controller demand. (CR 2009107460) ☐

4.4.10 After temperature stabilized with 1C HX on service, **place** 1B CCW HX in Standby by closing 1B CCW HX OUTLET VLV Q1P17V008B. ☐

4.4.11 **Verify** flow decrease on FI 3043BA. ☐

4.4.12 **Verify** SW FROM 1B CCW HX Q1P16FV3009B fully closed. ☐

4.4.13 **Close** power supply breaker Q1R17BKRFVD5, SW TO 1B CCW HX Q1P16MOV3130B. ☐

4.4.14 **Close** SW TO 1B CCW HX Q1P16MOV3130B. ☐

4.4.15 **Notify** Chemistry of current alignment of CCW HX's, for monitoring purposes. ☐

4.5 "B" Train on Service, Shifting to the Standby HX 1B

4.5.1 **Ensure** CCW HX 1B is aligned to the B Train CCW and B Train Service Water per Appendix FNP-1-SOP-23.0B. ☐

4.5.2 **Verify** SW FROM 1B CCW HX Q1P16FV3009B handswitch is in MOD. ☐

4.5.3 **Verify** 1B CCW HX DISCH FCV HIC 3009B is demanding the valve to be fully closed (100% demand). ☐

4.5.4 Locally **verify** closed SW FROM 1B CCW HX Q1P16FV3009B. ☐

4.5.5 **Open** SW TO 1B CCW HX Q1P16MOV3130B. ☐

4.5.6 **Adjust** 1B CCW HX DISCH FCV, HIC 3009B to obtain approximately 2000 gpm SW flow on FI 3009BA. ☐

4.5.7 **Open** 1B CCW HX CCW OUTLET ISO, Q1P17V008B. ☐

4.5.8 **Verify** flow increases on FI 3043BA. ☐

CAUTION

CCW temperature should be maintained as stable as possible to minimize effects on the following:

- Reactivity changes due to changes in letdown temperature
- RCP Oil Levels ☐

4.5.9 **Throttle** open 1B CCW HX DISCH FCV HIC 3009B while throttling closed 1A CCW HX DISCH FCV HIC 3009A.

- **Maintain** existing service water pressure. ☐
- **Ensure** CCW temperature is maintained less than 105°F. (120°F if aligned for plant cooldown.) ☐
- Locally **check** 1B CCW HX DISCH FCV 3009B responds to controller demand. (CR 2009107460) ☐

4.5.10 After temp stabilized with 1B HX on service, **place** 1A CCW HX in Standby by closing 1A CCW HX OUTLET VLV Q1P17V008A. ☐

4.5.11 **Verify** flow decreases on FI 3043AA. ☐

4.5.12 **Verify** 1A CCW HX DISCH FCV HIC 3009A fully closed. ☐

4.5.13 **Close** SW TO 1A CCW HX Q1P16MOV3130A. ☐

4.5.14 **Notify** Chemistry of current alignment of CCW HX's, for monitoring purposes. ☐

4.6 "B" Train on Service, Shifting to the Standby HX 1A

4.6.1 **Ensure** 1B CCW HX is aligned to the B Train CCW and B Train Service Water per Appendix 23.0B. ☐

4.6.2 **Verify** SW FROM 1A CCW HX Q1P16FV3009A handswitch is in MOD. ☐

4.6.3 **Verify** 1A CCW HX DISCH FCV HIC 3009A is demanding the valve to be fully closed (100% demand). ☐

4.6.4 Locally **verify** closed SW from 1A CCW HX Q1P16FV3009A. ☐

4.6.5 **Open** SW TO 1A CCW HX Q1P16MOV3130A. ☐

4.6.6 **Adjust** 1A CCW HX DISCH FCV, HIC 3009A to obtain approximately 2000 gpm SW flow on FI 3009AA ☐

4.6.7 **Open** 1A CCW HX CCW OUTLET ISO, Q1P17V008A to place 1A HX on service. ☐

4.6.8 **Verify** flow increases on FI 3043AA. ☐

CAUTION

CCW temperature should be maintained as stable as possible to minimize effects on the following:

- Reactivity changes due to changes in letdown temperature
- RCP Oil Levels ☐

4.6.9 **Throttle** open 1A CCW HX DISCH FCV HIC 3009A while throttling closed 1B CCW HX DISCH FCV HIC 3009B.

- **Maintain** existing service water pressure. ☐
- **Ensure** CCW temperature is maintained less than 105°F. (120°F if aligned for plant cooldown.) ☐
- Locally **check** 1A CCW HX DISCH FCV 3009A responds to controller demand. (CR 2009107460) ☐

4.6.10 After temperature stabilized with HX 1A on service, **place** 1B CCW HX in Standby by closing 1B CCW HX CCW OUTLET ISO, Q1P17V008B. ☐

4.6.11 **Verify** flow decrease on FI 3043BA. ☐

4.6.12 **Verify** 1B CCW HX DISCH FCV HIC 3009B fully closed. ☐

4.6.13 **Close** SW TO 1B CCW HX Q1P16MOV3130B. ☐

4.6.14 **Notify** Chemistry of current alignment of CCW HX's, for monitoring purposes. ☐

4.7 Shifting CCW Pumps on the On-Service Train

4.7.1 **Monitor** CCW flow annunciators and RCP thermal barrier valves during and after this evolution. ☐

NOTE

Step 4.7.2 or Step 4.7.3 is performed to minimize the pressure transient which could otherwise result in CCW to Thermal Barrier HX isolation. ☐

4.7.2 IF A Train is the on service train, THEN **open** CCW TO 1A RHR HX Q1P17MOV3185A. ☐

4.7.3 IF B Train is the on service train, THEN **open** CCW TO 1B RHR HX Q1P17MOV3185B. ☐

CAUTIONS

The operation of two pumps through on HX is **NOT** allowed.

CCW temperature should be maintained as stable as possible to minimize effects on the following:

- Reactivity changes due to changes in letdown temperature
- RCP Oil Levels ☐

4.7.4 Simultaneously **start** the Standby CCW pump and **stop** the on service CCW pump. ☐

4.7.5 **Verify** the proper flow response on the appropriate flow indicator.

- FI 3043AA ☐
- FI 3043BA, ☐
- FI 3043CA ☐

4.7.6 IF A Train is the on service train, THEN **close** CCW TO 1A RHR HX Q1P17MOV3185A unless required to support RHR operation. ☐

4.7.7 IF B Train is the on service train, THEN **close** CCW TO 1B RHR HX Q1P17MOV3185B unless required to support RHR operation. ☐

4.7.8 IF placing 1B CCW pump in service to replace an inoperable CCW pump, THEN **perform** one of the following. (Otherwise 1B CCW pump will not sequence on following a SI/LOSP)

4.7.8.1 **Rackout** the supply breaker for the inoperable pump. ☐

4.7.8.2 **Perform** APPENDIX 15, ENABLING THE 1B CCW PUMP TO AUTO-START FOR 1C CCW PUMP. ☐

4.7.8.3 **Perform** APPENDIX 16, ENABLING THE 1B CCW PUMP TO AUTO-START FOR 1A CCW PUMP ☐

NOTE

The off-service train is normally in operation in modes 1–4 supplying the operating charging pump, with the non-operating SFP HX flowpath aligned and CCW to the RHR HX isolated. (Reference RER 1080944901) ☐

4.8 Operation of Off-Service CCW Train - Train A

4.8.1 **Verify** the off-service train A, SW FROM 1C CCW HX Q1P16FV3009C handswitch in MOD. ☐

4.8.2 **Throttle** 1C CCW HX DISCH FCV HIC 3009C as necessary to control CCW temperature. ☐

4.8.3 **Verify** the off-service train 1C CCW HX CCW OUTLET ISO, Q1P17V008C is open. ☐

4.8.4 **Verify** open CCW TO 1A RHR HX Q1P17MOV3185A. ☐

4.8.5 **Start** the off-service train 1C CCW PUMP. ☐

4.8.6 **Verify** flow increases on FI 3043CA. ☐

4.8.7 **Monitor** CCW HX outlet temperature to ensure CCW temperature is maintained less than 105°F (120°F IF aligned for plant cooldown). ☐

NOTE

CCW TO 1A RHR HX Q1P17MOV3185A should remain open, if swapping the on service train is in progress, to prevent system pressure spike when CCW trains are cross connected during swap. (1-95-063)

Minimize operating time with CCW flow > 6000 gpm. ☐

4.8.8 IF operation of A Train RHR NOT anticipated, THEN **close** CCW TO 1A RHR HX Q1P17MOV3185A. ☐

4.8.9 IF it is desired to secure the 1C CCW pump, THEN **check** that conditions exist to allow securing the 1C CCW pump. ☐

4.8.9.1 **Check** for the following conditions:

- Spent fuel pool cooling is aligned to B Train. ☐
- 1A RHR pump is **not** running. ☐
- 1A charging pump or 1B charging pump (if aligned to A Train) **not** running. ☐
- No other reasons exist to maintain 1C CCW pump running. ☐

4.8.9.2 IF above conditions are NOT met, THEN **notify** the Shift Supervisor that 1C CCW pump is required for plant operations. ☐

4.8.10 IF these conditions are **satisfied**, THEN the 1C CCW Pump may be stopped. ☐

4.8.11 IF the 1C CCW pump is stopped, THEN **open** CCW TO 1A RHR HX Q1P17MOV3185A. ☐

NOTE

The off-service train is normally in operation in modes 1–4 supplying the operating charging pump, with the non-operating SFP HX flowpath aligned and CCW to the RHR HX isolated. (Reference RER 1080944901) ☐

4.9 Operation of Off-Service CCW Train - Train B

4.9.1 **Verify** the off-service train B, SW FROM 1A CCW HX Q1P16FV3009A handswitch in MOD. ☐

4.9.2 **Throttle** 1A CCW HX DISCH FCV HIC 3009A as necessary to control CCW temperature. ☐

4.9.3 **Verify** the off-service train 1A CCW HX CCW OUTLET ISO, Q1P17V008A is open. ☐

4.9.4 **Verify** open CCW TO 1B RHR HX Q1P17MOV3185B. ☐

4.9.5 **Start** the off-service train 1A CCW PUMP. ☐

4.9.6 **Verify** flow increases on FI 3043AA. ☐

4.9.7 **Monitor** CCW HX outlet temperature to ensure CCW temperature is maintained less than 105°F (120°F IF aligned for plant cooldown). ☐

NOTE

CCW TO 1B RHR HX Q1P17MOV3185B should remain open, if swapping the on service train is in progress, to prevent system pressure spike when CCW trains are cross connected during swap. (1-95-063)

Minimize operating time with CCW flow > 6000 gpm. ☐

4.9.8 IF operation of B Train RHR NOT anticipated, THEN **close** CCW TO 1B RHR HX Q1P17MOV3185B. ☐

4.9.9 IF it is desired to secure the 1A CCW pump, THEN **check** that conditions exist to allow securing the 1A CCW pump.

4.9.9.1 **Check** for the following conditions:

- Spent fuel pool cooling is aligned to A Train. ☐
- 1B RHR pump is NOT running. ☐
- 1C charging pump or 1B charging pump (if aligned to B Train) NOT running. ☐
- No other reasons exist to maintain 1A CCW pump running. ☐

4.9.9.2 IF above conditions are NOT met, THEN **notify** the Shift Supervisor that 1A CCW pump is required for plant operations. ☐

4.9.10 IF these conditions are **satisfied**, THEN the 1A CCW Pump may be stopped. ☐

4.9.11 IF the 1A CCW pump is stopped, THEN **open** CCW TO 1B RHR HX Q1P17MOV3185B. ☐

4.10 Aligning CCW for Plant Cooldown with A Train

NOTE

Plant cooldown may require operation of four service water pumps. ☐

4.10.1 **Start** additional service water pumps as required per FNP-1-SOP-24.0, SERVICE WATER SYSTEM. ☐

4.10.2 IF placing 1A RHR pump in service in the off-service train, THEN **verify** Train A CCW in operation per Section 4.8. ☐

4.10.3 **Verify** open Train A CCW TO 1A RHR HX Q1P17MOV3185A (Q1P17V029A). ☐

CAUTION

Do not exceed a spent fuel pool water temperature of 120°F. ☐

4.10.4 IF desired to increase CCW flow through the RHR HX OR to limit flow through CCW HX, THEN **close** CCW TO 1B SFP HX Q1P17MOV3094B. ☐

4.11 Aligning CCW for Plant Cooldown with B Train

NOTE

Plant cooldown may require operation of four service water pumps. ☐

4.11.1 **Start** additional service water pumps as required per FNP-1-SOP-24.0, SERVICE WATER SYSTEM. ☐

4.11.2 IF placing 1B RHR pump in service in the off-service train, THEN **verify** Train B CCW in operation per Section 4.9. ☐

4.11.3 **Verify** open off-service Train B CCW TO 1B RHR HX Q1P17MOV3185B. ☐

CAUTION

Do not exceed a spent fuel pool water temperature of 120°F. ☐

4.11.4 IF desired to increase CCW flow through the RHR HX OR to limit flow through CCW HX, THEN **close** off-service train B CCW TO 1A SFP HX Q1P17MOV3094A. ☐

NOTE

During the performance of the following section, Precaution and Limitation 2.18 should be referenced. ☐

4.12 Aligning Additional CCW Cooling to the SFP HX--A Train

4.12.1 The plant is in Modes 5, 6 OR defueled AND it has become necessary to provide additional cooling to the A Train SFP HX. ☐

4.12.2 **Throttle** closed 1A RHR HX CCW OUTLET ISO, Q1P17V028A AND / OR **throttle** open 1B SFP HX CCW OUTLET ISO, Q1P17V016B as required. ☐

4.12.3 **Initiate** an admin LCO per Precaution and Limitation 2.18.2.

4.12.4 During core reload OR prior to Mode 4 entry, **reestablish** the 1500 gpm limit as follows:

4.12.4.1 **Verify** open Train A CCW To 1A RHR HX Q1P17MOV3185A. ☐

4.12.4.2 **Verify** open Train A CCW TO 1B SFP HX Q1P17MOV3094B. ☐

4.12.4.3 **Throttle** 1B SFP HX CCW OUTLET ISO, Q1P17V016B, as required to limit flow through the SFP HX to 1500 gpm. ☐

4.12.4.4 **Verify** open 1A RHR HX CCW OUTLET ISO, Q1P17V028A and seal in position. ☐

4.12.4.5 **Verify** 1B SFP HX CCW OUTLET ISO, Q1P17V016B, throttled as required to limit flow through the SFP HX to 1500 gpm, and seal in position. ☐

4.12.5 Independently **Verify** the following:

- 1B SFP HX CCW OUTLET ISO, Q1P17V016B sealed throttled. ☐
- 1A RHR HX CCW OUTLET ISO, Q1P17V028A sealed open. ☐
- CCW TO 1A RHR HX Q1P17MOV3185A open. ☐

NOTE

During the performance of the following section, Precaution and Limitation 2.18 should be referenced. ☐

4.13 Aligning Additional CCW Cooling to the SFP HX--"B" Train

4.13.1 The plant is in Modes 5, 6 OR defueled AND it has become necessary to provide additional cooling to the B Train SFP HX. ☐

4.13.2 **Throttle** closed 1B RHR HX CCW OUTLET ISO, Q1P17V028B AND / OR **throttle** open 1A SFP HX CCW OUTLET ISO, Q1P17V016A as required. ☐

4.13.3 **Initiate** an admin LCO per Precaution and Limitation 2.18.2**.** ☐

4.13.4 During core reload OR prior to Mode 4 entry, **reestablish** the 1500 gpm limit as follows:

4.13.4.1 **Verify** open Train B CCW TO 1B RHR HX Q1P17MOV3185B. ☐

4.13.4.2 **Verify** open Train B CCW TO A SFP HX Q1P17MOV3094A. ☐

4.13.4.3 **Verify** open 1B RHR HX CCW OUTLET ISO, Q1P17V028B and seal in position. ☐

4.13.4.4 **Verify** 1A SFP HX CCW OUTLET ISO, Q1P17V016A, throttled as required to limit flow through the SFP HX to 1500 gpm, and seal in position. ☐

4.13.5 Independently **verify** the following:

- A SFP HX CCW OUTLET ISO, Q1P17V016A sealed throttled. ☐
- 1B RHR HX CCW OUTLET ISO, Q1P17V028B sealed open. ☐
- CCW TO 1B RHR HX Q1P17MOV3185B open. ☐

4.14 Removing CCW from Plant Cooldown Lineup—A Train On Service

4.14.1 **Verify** open CCW TO 1B SFP HX Q1P17MOV3094B. ☐

4.14.2 **Close** CCW TO 1A RHR HX Q1P17MOV3185A. ☐

4.14.3 IF required, THEN **secure** the off-service B Train CCW train as follows:

4.14.3.1 **Stop** the 1A CCW PUMP. ☐

4.14.3.2 **Open** B Train CCW TO 1A SFP HX Q1P17MOV3094A if closed. ☐

4.14.3.3 **Verify** open B Train CCW TO 1B RHR HX Q1P17MOV3185B. ☐

4.14.3.4 **Verify** fully open off-service train RHR HX CCW OUTLET VLV Q1P17V028B. ☐

4.15 Removing CCW from Plant Cooldown Lineup—"B" Train On service

4.15.1 **Verify** open CCW TO 1A SFP HX Q1P17MOV3094A. ☐

4.15.2 **Close** CCW TO 1B RHR HX Q1P17MOV3185B. ☐

4.15.3 IF required, THEN **secure** the off-service CCW train as follows:

4.15.3.1 **Stop** 1C CCW PUMP. ☐

4.15.3.2 **Open** CCW TO 1B SFP HX Q1P17MOV3094B if closed. ☐

4.15.3.3 **Verify** open CCW TO 1A RHR HX Q1P17MOV3185A. ☐

4.15.3.4 **Verify** fully open RHR HX CCW OUTLET VLV Q1P17V028A. ☐

4.16 Shifting On-Service Train from A Train to B Train

4.16.1 **Notify** Shift Chemist that on service train will be shifted. ☐

4.16.2 **Shift** train alignment from A Train to B Train by performing Appendix 23.0B. ☐

4.17 Shifting On-Service Train from B Train to A Train

4.17.1 **Notify** Shift Chemist that on service train will be shifted. ☐

4.17.2 **Shift** train alignment from B Train to A Train by performing Appendix FNP-1-SOP-23.0C. ☐

4.18 Normal Makeup to CCW Surge Tank

4.18.1 **Notify** Shift Chemist that the CCW surge tank is to be made up to. ☐

4.18.2 **Verify** open CCW SRG TK VT valves: (MCB)

- Q1P17SV3028A ☐
- Q1P17SV3028B ☐

4.18.3 **Monitor** CCW surge tank level indications.

- LI-3027A ☐
- LI-3027B ☐

4.18.4 **Maintain** level between 35 inches and 50 inches. ☐

4.18.5 IF desired, THEN **open** MKUP TO CCW FROM DW STOR TK Q1P17MOV3030A to add makeup to A portion of CCW surge tank. ☐

4.18.6 IF desired, THEN **open** MKUP TO CCW FROM DW STOR TK Q1P17MOV3030B to add makeup to B portion of CCW surge tank. ☐

4.18.7 WHEN makeup addition is completed, THEN **close** appropriate valve(s).

- MKUP TO CCW FROM DW STOR TK Q1P17MOV3030A. ☐
- MKUP TO CCW FROM DW STOR TK Q1P17MOV3030B. ☐

4.19 Emergency Makeup to CCW Surge Tank

CAUTION
Reactor makeup water should only be used as an emergency source of makeup water to the CCW surge tank. ☐

4.19.1 **Close** CCW SRG TK DEMIN INLET ISO, N1P11V045. ☐

4.19.2 **Verify** open CCW SRG TK VT valves: (MCB)

- Q1P17SV3028A ☐
- Q1P17SV3028B ☐

4.19.3 **Monitor** CCW surge tank level indications.

- LI-3027A ☐
- LI-3027B ☐

4.19.4 **Maintain** level between 35 inches and 50 inches. ☐

4.19.5 IF desired, THEN **open** MKUP TO CCW FROM RMW Q1P17MOV3031A to add makeup to the A portion of the CCW surge tank. ☐

4.19.6 IF desired, THEN **open** MKUP TO CCW FROM RMW Q1P17MOV3031B to add makeup to the B portion of the CCW surge tank. ☐

4.19.7 WHEN makeup addition is completed, THEN **close** appropriate valve(s).

- MKUP TO CCW FROM RMW Q1P17MOV3031A ☐
- MKUP TO CCW FROM RMW Q1P17MOV3031B ☐

4.19.8 **Open** CCW SRG TK DEMIN INLET ISO, N1P11V045. ☐

4.20 Chemical Mixing

4.20.1 **Perform** Appendix FNP-1-SOP-23.0A for chemical mixing. ☐

4.21 Lowering Surge Tank Level

4.21.1 **Verify** open CCW SRG TK VT valves: (MCB)

- Q1P17SV3028A ☐
- Q1P17SV3028B ☐

4.21.2 **Uncap** and **attach** a suitable fitting and hose to CCW SRG TK A TRN DRN, Q1P17V113A and route to a drum. ☐

4.21.3 **Open** CCW SRG TK A TRN DRN, Q1P17V113A to lower surge tank level. Ensure that the drum does not overflow. ☐

4.21.4 **Close** CCW SRG TK A TRN DRN, Q1P17V113A when the desired level is obtained, **remove** the hose and fitting and **replace** the pipe cap. ☐

4.22 Venting the CCW Heat Exchangers, SW Side

CAUTION
Pipe internals can be potentially degraded. Proceed with caution. Do not subject vent/drain piping to any undue stress during removal of pipe cap/plug. (AI2009202698). ☐

4.22.1 **Verify** the tube side vents and drains closed per Table 1. ☐

Table 1

	HX 1A	HX 1B	HX 1C
Tube side drain	Q1P16V005B	Q1P16V005D	Q1P16V005F
Tube side drain	Q1P16V005A	Q1P16V005C	Q1P16V005E
Tube side vent	Q1P16V004A	Q1P16V004B	Q1P16V004C
SW inlet drain	Q1P16V257A	Q1P16V257B	Q1P16V257C
SW outlet vent	Q1P16V004D	Q1P16V004E	Q1P16V004F

4.22.2 **Verify** the applicable HX DISCH FCV closed.

- 1A CCW HX DISCH FCV HIC 3009A ☐
- 1B CCW HX DISCH FCV HIC 3009B ☐
- 1C CCW HX DISCH FCV HIC 3009C ☐

4.22.3 **Throttle** open appropriate valve as required to provide a source of water for the venting operation.

- 1A CCW HX DISCH FCV HIC 3009A ☐
- 1B CCW HX DISCH FCV HIC 3009B ☐
- 1C CCW HX DISCH FCV HIC 3009C ☐

4.22.4 **Open** the tube side vent per Table 1 until air free water issues, then **close** and cap. ☐

4.22.5 **Open** the SW outlet vent per Table 1 until air free water issues, then **close** and **cap** ☐

4.22.6 **Close** the appropriate valve service water flow control valve.

- 1A CCW HX DISCH FCV HIC 3009A
- 1B CCW HX DISCH FCV HIC 3009B
- 1C CCW HX DISCH FCV HIC 3009C

4.22.7 **Align** the heat exchangers for service or standby operation as required. ☐

NOTE

Reference Tech Spec 3.6.3 and TRM 13.6.2 for Containment Isolation Valves. ☐

4.23 Alternate Method of Opening CCW FROM RCP THRM BARR Q1P17HV3045 with High ΔP Suspected (OR 2-99-603)

4.23.1 IF MCB handswitch does not open CCW FROM RCP THRM BARR Q1P17HV3045, AND high ΔP is the suspected cause, THEN **wait** approximately 10~15 minutes or as determined by the Shift Supervisor and **re-attempt** to open the valve. This may be repeated for up to 3 hours to allow the pressure to equalize. ☐

CAUTION

Do not use any mechanical leverage on CCW FROM RCP THRM BARR Q1P17HV3045 handwheel. Damage to the pin which connects the handwheel to the valve stem may result. (OR 2-98-320) ☐

4.23.2 IF requested by the Shift Supervisor, THEN **open** CCW FROM RCP THRM BARR Q1P17HV3045 with the manual handwheel as follows:

4.23.2.1 **Fail** air to CCW FROM RCP THRM BARR Q1P17HV3045. ☐

4.23.2.2 **Open** CCW FROM RCP THRM BARR Q1P17HV3045 with the manual handwheel. ☐

4.23.2.3 **Restore** air to CCW FROM RCP THRM BARR Q1P17HV3045. ☐

4.23.2.4 **Return** the handwheel for CCW FROM RCP THRM Q1P17HV3045 to the neutral position. ☐

CAUTION

Do not open or attempt to open CCW FROM RCP THRM BARR Q1P17HV3045 while CCW DISCH EXC LTDN & RCDT HXS DRN Q1P17V161 or RCP'S THRM BARR CCW RTN TEST CONN Q1P17V173 is open. ☐

4.23.3 IF requested by the Shift Supervisor, THEN **equalize** pressure around CCW FROM RCP THERMAL BARRIERS CHECK VALVE Q1P17V106 (downstream of CCW FROM RCP THRM BARR Q1P17HV3045 and Q1P17HV3184) as follows.

4.23.3.1 **Uncap** and **attach** a hose which has been tested to 150 psig to CCW DISCH EXC LTDN & RCDT HXS DRN Q1P17V161 (1" valve) (Pen 46 – 121' PPR). ☐

4.23.3.2 **Uncap** RCP'S THRM BARR CCW RTN TEST CONN Q1P17V173 (3/4" valve) (Pen 43 – 121' PPR). Do not attach hose yet. ☐

4.23.3.3 **Verify** closed CCW FROM RCP THRM BARR Q1P17HV3045. ☐

NOTE

"Cracking open" in the following step is defined as open sufficient to permit flow. This may be achieved by "feel" as the valve comes off the closed seat, as well as possible flow noise. (AI 2008205965) ☐

CAUTION

To minimize flow perturbations in the CCW return header when opening CCW DISCH EXC LTDN & RCDT HXS DRN Q1P17V161, slowly open the valve and only as much as necessary to slowly fill the hose. ☐

4.23.3.4 **Route** hose to a suitable container AND **fill** hose with CCW by slowly cracking open CCW DISCH EXC LTDN & RCDT HXS DRN Q1P17V161. ☐

4.23.3.5 WHEN hose is filled with CCW, THEN **close** CCW DISCH EXC LTDN & RCDT HXS DRN Q1P17V161. ☐

4.23.3.6 **Attach** hose to RCP'S THRM BARR CCW RTN TEST CONN Q1P17V173. ☐

4.23.3.7 **Open** CCW DISCH EXC LTDN & RCDT HXS DRN Q1P17V161. ☐

4.23.3.8 **Open** RCP'S THRM BARR CCW RTN TEST CONN Q1P17V173. ☐

NOTE

This flow path requires backflow through a Kerotest stop-check valve. Monitor for evidence of the Kerotest valve sticking closed. ☐

4.23.3.9 **Monitor** for evidence of proper pressure equalization (momentary flow noise or pipe/valve vibration, etc.). ☐

4.23.3.10 WHEN pressure has equalized, THEN **close** RCP'S THRM BARR CCW RTN TEST CONN Q1P17V173. ☐

4.23.3.11 **Close** CCW DISCH EXC LTDN & RCDT HXS DRN Q1P17V161. ☐

4.23.3.12 **Attempt** opening CCW FROM RCP THRM BARR Q1P17HV3045 per steps 4.25.1and/or 4.25.2. ☐

4.23.3.13 WHEN pressure equalization is complete, THEN **remove** hose, using a suitable container and absorbent material or other appropriate means to contain residual CCW pressure and fluid in the hose. ☐

4.23.3.14 **Verify** closed and cap RCP'S THRM BARR CCW RTN TEST CONN Q1P17V173. ☐

4.23.3.15 **Verify** closed and cap CCW DISCH EXC LTDN & RCDT HXS DRN Q1P17V161. ☐

4.23.3.16 **Collect** and **dispose** of waste CCW in accordance with FNP-0-SHP-30, WASTE DISPOSAL. ☐

4.23.4 IF unable to open CCW FROM RCP THRM BARR Q1P17HV3045 from the handwheel or the MCB, THEN **write** a CR to have the condition investigated. ☐

NOTE

Reference Tech Spec 3.6.3 and TRM 13.6.2 for Containment Isolation Valves. ☐

4.24 Alternate Method of Opening CCW FROM RCP THRM BARR Q1P17HV3184 with High ΔP Suspected (OR 2-99-603)

4.24.1 IF MCB handswitch does not open CCW FROM RCP THRM BARR (Q1P17HV3184, AND high ΔP is the suspected cause, THEN **wait** approximately 10~15 minutes or as determined by the Shift Supervisor and **re-attempt** to open the valve. This may be repeated for up to 3 hours to allow the pressure to equalize. ☐

NOTE

A containment entry will need to be done to use the manual handwheel on Q1P17HV3184. ☐

CAUTION

Do not use any mechanical leverage on CCW FROM RCP THRM BARR Q1P17HV3045 (Q1P17HV3184) handwheel. Damage to the pin which connects the handwheel to the valve stem may result. (OR 2-98-320) ☐

4.24.2 IF requested by the Shift Supervisor, THEN **open** CCW FROM RCP THRM BARR Q1P17HV3184 with the manual handwheel as follows:

4.24.2.1 **Fail** air to CCW FROM RCP THRM BARR Q1P17HV3184. ☐

4.24.2.2 **Open** CCW FROM RCP THRM BARR Q1P17HV3184 with the manual handwheel. ☐

4.24.2.3 **Restore** air to CCW FROM RCP THRM BARR Q1P17HV3184. ☐

4.24.2.4 **Return** the handwheel for CCW FROM RCP THRM Q1P17HV3184 to the neutral position. ☐

CAUTION

Do not open or attempt to open CCW FROM RCP THRM BARR Q1P17HV3184 while CCW DISCH EXC LTDN & RCDT HXS DRN Q1P17V161 or RCP'S THRM BARR CCW RTN TEST CONN Q1P17V173 is open. ☐

4.24.3 IF requested by the Shift Supervisor, THEN **equalize** pressure around CCW FROM RCP THERMAL BARRIERS CHECK VALVE Q1P17V106 (downstream of CCW FROM RCP THRM BARR Q1P17HV3045 and Q1P17HV3184) as follows.

4.24.3.1 **Uncap** and **attach** a hose which has been tested to 150 psig to CCW DISCH EXC LTDN & RCDT HXS DRN Q1P17V161 (1" valve) (Pen 46 – 121' PPR). ☐

4.24.3.2 **Uncap** RCP'S THRM BARR CCW RTN TEST CONN Q1P17V173 (3/4" valve) (Pen 43 – 121' PPR). Do not attach hose yet. ☐

NOTE

When verifying Q1P17HV3184 closed, Q1P17HV3045 will be required to be open. ☐

4.24.3.3 **Verify** closed CCW FROM RCP THRM BARR Q1P17HV3184. ☐

NOTE

"Cracking open" in the following step is defined as open sufficient to permit flow. This may be achieved by "feel" as the valve comes off the closed seat, as well as possible flow noise. (AI 2008205965) ☐

CAUTION

To minimize flow perturbations in the CCW return header when opening CCW DISCH EXC LTDN & RCDT HXS DRN Q1P17V161, slowly open the valve and only as much as necessary to slowly fill the hose. ☐

4.24.3.4 **Route** hose to a suitable container AND **fill** hose with CCW by slowly cracking open CCW DISCH EXC LTDN & RCDT HXS DRN Q1P17V161. ☐

4.24.3.5 WHEN hose is filled with CCW, THEN **close** CCW DISCH EXC LTDN & RCDT HXS DRN Q1P17V161. ☐

4.24.3.6 **Attach** hose to RCP'S THRM BARR CCW RTN TEST CONN Q1P17V173. ☐

4.24.3.7 **Open** CCW DISCH EXC LTDN & RCDT HXS DRN Q1P17V161. ☐

4.24.3.8 **Open** RCP'S THRM BARR CCW RTN TEST CONN Q1P17V173. ☐

NOTE

This flow path requires backflow through a Kerotest stop-check valve. Monitor for evidence of the Kerotest valve sticking closed. ☐

4.24.3.9 **Monitor** for evidence of proper pressure equalization (momentary flow noise or pipe/valve vibration, etc.). ☐

4.24.3.10 WHEN pressure has equalized, THEN **close** RCP'S THRM BARR CCW RTN TEST CONN Q1P17V173. ☐

4.24.3.11 **Close** CCW DISCH EXC LTDN & RCDT HXS DRN Q1P17V161. ☐

4.24.3.12 **Attempt** opening CCW FROM RCP THRM BARR Q1P17HV3184 per Steps 4.25.1 and/or 4.25.2. ☐

4.24.3.13 WHEN pressure equalization is complete, THEN **remove** hose, using a suitable container and absorbent material or other appropriate means to contain residual CCW pressure and fluid in the hose. ☐

4.24.3.14 **Verify** closed and **cap** RCP'S THRM BARR CCW RTN TEST CONN Q1P17V173. ☐

4.24.3.15 **Verify** closed and **cap** CCW DISCH EXC LTDN & RCDT HXS DRN Q1P17V161. ☐

4.24.3.16 **Collect** AND **dispose** of waste CCW in accordance with FNP-0-SHP-30, WASTE DISPOSAL. ☐

4.24.4 IF unable to open CCW FROM RCP THRM BARR Q1P17HV3184 from the handwheel OR the MCB, THEN **write** a CR to have the condition investigated. ☐

NOTES

Reference Tech Spec 3.6.3 and TRM 13.6.2 for Containment Isolation Valves. ☐

Thermal expansion of water in the thermal barrier may cause an excessive pressure in the return line requiring the high pressure isolation function of HV3184 to be defeated. ☐

4.25 Restoring CCW Flow to the RCP Thermal Barriers after an Extended (> 4 hour) Loss:

4.25.1 **Verify** closed CCW FROM THERMAL BARR Q1P17HV3045. ☐

4.25.2 **Verify** open CCW FROM THERMAL BARR Q1P17HV3184. If valve cannot be opened from the MCB, then use Step 4.25.3 or 4.25.4 to open. ☐

CAUTION

Do not use any mechanical leverage on CCW FROM RCP THRM BARR Q1P17HV3184 handwheel. Damage to the pin which connects the handwheel to the valve stem may result. (OR 2-98-320) ☐

4.25.3 IF requested by the Shift Supervisor, THEN **have** I&C defeat the high pressure isolation function of CCW FROM RCP THRM BARR Q1P17HV3184. ☐

NOTE

CCW FROM RCP THRM BARR Q1P17HV3184 should open when the lead is lifted in the following step. ☐

4.25.3.1 In termination cabinet Q1H25L031B **lift** lead C-2 (red wire) from 1TB1-25. (ref. D177855) ☐

4.25.3.2 **Verify** open CCW FROM RCP THRM BARR Q1P17HV3184. IF open, THEN **GO TO** Step 4.25.5. ☐

4.25.4 IF requested by the Shift Supervisor, THEN **open** CCW FROM RCP THRM BARR Q1P17HV3184 with the manual handwheel as follows:

4.25.4.1 **Fail** air to CCW FROM RCP THRM BARR Q1P17HV3184. ☐

4.25.4.2 **Open** CCW FROM RCP THRM BARR Q1P17HV3184 with the manual handwheel. ☐

4.25.4.3 **Restore** air to CCW FROM RCP THRM BARR Q1P17HV3184. ☐

4.25.4.4 **Return** the handwheel for CCW FROM RCP THRM Q1P17HV3184 to the neutral position. ☐

NOTE

RCP Seal Parameters and R-17 A/B should be monitored during the following steps. ☐

4.25.5 **Fail** air to CCW FROM RCP THRM BARR Q1P17HV3045. ☐

NOTE

"Crack open" in the following step is defined as open sufficient to permit flow. This may be achieved by "feel" as the valve comes off the closed seat, as well as possible flow noise. The concern is the CCW is at ambient conditions, which may be elevated much higher than normal and any rapid changes may introduce a water hammer in the system causing potential damage. (AI 2008205965) ☐

4.25.6 To initiate a slow cool down of the thermal barrier, crack **open** CCW FROM RCP THRM BARR Q1P17HV3045 with manual handwheel until flow can be heard. If desired, flow can be monitored at Q1P17FISH3045 (Rm 218, BTRS Chiller Room). ☐

4.25.7 After about 30 minutes, slowly **open** CCW FROM RCP THRM BARR Q1P17HV3045 to full open position. ☐

4.25.8 **Restore** air to CCW FROM RCP THRM BARR Q1P17HV3045. ☐

4.25.9 **Return** the handwheel for CCW FROM RCP THRM Q1P17HV3045 to the neutral position. ☐

4.25.10 IF leads lifted per Step 4.25.3, THEN **perform** the following:

4.25.10.1 In termination cabinet Q1H25L031B, have I&C **verify** PS-1 (N1P17PSH3184A-B), PS-2 (N1P17PSH3184B-B) and PS-3 (N1P17PSH3184C-C) contacts are open by checking continuity. Measure from lifted wire C2 to 1TB1-24. (ref. D177855) ☐

4.25.10.2 **Re-land** lead C-2 (red wire) at 1TB1-25. ☐

5.0 REFERENCES

5.1 CCW pump technical manual U-169494A

5.2 DBA calculation SM-ES-89-1499-007, Service Water System Flow Balance Evaluation

5.3 FSAR-Chapter 9, section 9.2

5.4 D-175002 Sheets 1 & 2 Component Cooling Water System

5.5 D-175003, Sheet 1, Service Water System

5.6 D-175023, Process Flow Diagram Component Cooling Water System

5.7 U-176880, Assembly Drawing For FV-3009B

5.8 U-732963, Assembly Drawing For FV-3009A/3009C

5.9 U-176892 Outline drawing of butterfly valve w/piston, actuator, and access

5.10 B91-1-7431, Deletion of Lo-Lo Surge Tank Level Pump Trip

5.11 RER 1080944901

5.12 Westinghouse Letter BPC-88-549 on page 47 of U277513

5.13 DCP SNC 66497

6.0 Records

QA Record (X)	Non-QA Record (X)	Record Generated	Retention Time	R-Type
X		FNP-1-SOP-23.0	Life of Plant	HH6.051

APPENDIX 23.0A
CHEMICAL MIXING

Performed by: _____ Date _____

Verified by: _____ Date _____

Approved by: _____ Date _____

This appendix consists of 3 pages

APPENDIX 23.0A

CHEMICAL MIXING
(Page 1 of 3)

CAUTION
Only one chemical mixing isolation may be open at any time. Simultaneous opening of chemical mixing isolations in opposite trains will result in a loss of two independent CCW loops due to cross-connecting trains through the mixing valves. ☐

1.0 PURPOSE

To provide guidance for mixing chemicals in the CCW system.

2.0 INITIAL CONDITIONS

2.1 The version of this procedure has been verified to be the current version. (OR 1-98-498)

_____
Initial

2.2 The procedure has been verified to be the correct unit for the task. (OR 1-98-498)

_____
Initial

3.0 PRECAUTION AND LIMITATIONS

3.1 Only one chemical mixing isolation may be open at any time. Simultaneous opening of chemical mixing isolations in opposite trains will result in a loss of two independent CCW loops due to cross-connecting trains through the mixing valves.

APPENDIX 23.0A

CHEMICAL MIXING
(Page 2 of 3)

4.0 INSTRUCTIONS

4.1 **Perform** the following:

4.1.1 **Determine** the train that is to be chemically mixed; **consult** with the Shift Chemist. _____

- A Train ☐
- "B" Train ☐

4.1.2 **Verify** closed CCW SRG TK CHEM ADD, Q1P17V114. _____

4.1.3 **Check** the running CCW PUMP. _____

- 1A CCW Pump ☐
- 1B CCW Pump ☐
- 1C CCW Pump ☐

4.2 IF B CCW pump is the running pump, THEN **check** that B CCW pump is aligned to the proper train designated in Step 4.1.1. _____

4.3 IF 1A CCW pump is the running pump THEN **perform** the following:

4.3.1 **Verify** that 1B CCW PUMP CHEM MIXING ISO, Q1P17V278B is closed. _____

4.3.2 **Verify** that 1C CCW PUMP CHEM MIXING ISO, Q1P17V278C is closed. _____

4.3.3 **Open** 1A CCW PUMP CHEM MIXING ISO, Q1P17V278A. _____

NOTE

Minimum of 72 hours required to ensure adequate mixing in the CCW system. ☐

4.3.4 **Inform** the Shift Chemist of the start time for chemical mixing. _____

4.3.4.1 **Record** start time: _____

4.3.5 WHEN either of the following criteria satisfied, THEN **close** 1A CCW PUMP CHEM MIXING ISO, Q1P17V278A:

- Shift Chemist has obtained the required sample. ☐
- Minimum required 72 hours mixing time has lapsed AND chemical mixing no longer required. ☐

APPENDIX 23.0A

CHEMICAL MIXING

(Page 3 of 3)

4.4 IF 1B CCW pump is the running pump THEN **perform** the following:

4.4.1 **Verify** that 1A CCW PUMP CHEM MIXING ISO, Q1P17V278A is closed. _____

4.4.2 **Verify** that 1C CCW PUMP CHEM MIXING ISO, Q1P17V278C is closed. _____

4.4.3 **Open** 1B CCW PUMP CHEM MIXING ISO, Q1P17V278B. _____

NOTE
Minimum of 72 hours required to ensure adequate mixing in the CCW system. ☐

4.4.4 **Inform** the Shift Chemist of the start time for chemical mixing. _____

4.4.4.1 **Record** start time: _____

4.4.5 WHEN either of the following criteria satisfied, THEN **close** 1B CCW PUMP CHEM MIXING ISO, Q1P17V278B:

- Shift Chemist has obtained the required sample. ☐
- Minimum required 72 hours mixing time has lapsed AND chemical mixing no longer required. ☐

4.5 IF 1C CCW pump is the running pump THEN **perform** the following:

4.5.1 **Verify** that 1A CCW PUMP CHEM MIXING ISO, Q1P17V278A is closed. _____

4.5.2 **Verify** that 1B CCW PUMP CHEM MIXING ISO, Q1P17V278B is closed. _____

4.5.3 **Open** 1C CCW PUMP CHEM MIXING ISO, Q1P17V278C. _____

NOTE
Minimum of 72 hours required to ensure adequate mixing in the CCW system. ☐

4.5.4 **Inform** the Shift Chemist of the start time for chemical mixing. _____

4.5.4.1 **Record** start time: _____

4.5.5 WHEN either of the following criteria satisfied, THEN **close** 1C CCW PUMP CHEM MIXING ISO, Q1P17V278C:

- Shift Chemist has obtained the required sample. ☐
- Minimum required 72 hours mixing time has lapsed AND chemical mixing no longer required. ☐

APPENDIX 23.0B

SHIFTING ON SERVICE TRAIN
FROM TRAIN A TO TRAIN B

Performed by _____ Date _____

Verified By: _____ Date _____

Reviewed by: _____ Date _____

This appendix consists of 17 pages

Appendix 23.0B
(Page 1 of 17)

1.0 PURPOSE

1.1 Provides guidance for shifting the on service train from A Train to B Train.

1.2 Provides guidance for a separate check of 1B CCW pump alignment to B Train.

2.0 PRECAUTIONS AND LIMITATIONS

2.1 Shifting train alignment for 1B CCW pump and HX also shifts the miscellaneous header.

2.2 The operation of two pumps through one HX is not allowed.

2.3 CCW temperature should be maintained as stable as possible due to the effects on reactivity due to changes in letdown temperature. Also, changing CCW temperature could affect RCP oil levels which could cause level annunciators to come in. (AI 2005201097)

2.4 Minimize operating time with CCW flow > 6000 gpm.

2.5 It is desirable, if time permits, to allow the oncoming CCW temperature to increase to where it is equal or higher than the off-going train. This will minimize the reactivity effect and impact on RCP oil levels.(AI2008200245)

2.6 CCW TO 1B RHR HX Q1P17MOV3185B should remain open, while swapping the on-service train, to prevent system pressure spike when CCW trains are cross-connected during swap. (1-95-063)

2.7 In order for 1B CCW pump to be started by the ESS or LOSP sequencers; the train to which it is aligned must have the train dedicated pump supply breaker racked out.

2.8 When the 4160VC disconnects are operated, it is important to visually ensure(with a flashlight) that all three “Stabs” have either opened up or closed successfully due to the disconnect operation. Any operations involving manipulation of the 4kV disconnect switches associated shall include visual confirmation of the following:

2.8.1 The main contacts are in the required state, open or closed. (One contact per phase.) Refer to figure 1 and 2.

2.8.2 The arcing contacts are in the required state, open or closed. (One contact per phase.) Refer to figure 1 and 2.

3.0 INITIAL CONDITIONS

3.1 The version of this appendix has been verified to be the current version. (OR 1-98-498

_____ Initial

3.2 The appendix has been verified to be for the correct unit for the task. (OR 1-98-498)

_____ Initial

3.3 IF only performing a line up check of 1B CCW pump to B Train, THEN perform Section 9.0 of this appendix and the remaining portion of the appendix is N/A.

_____ Initial

3.4 1C CCW heat exchanger is in service prior to shifting the on service train from A Train to B Train.

3.4.1 IF the 1C CCW heat exchanger is in service, THEN **check** the following:

- Check open 1C CCW HX CCW OUTLET ISO, Q1P17V008C.

_____ Initial

- Check closed 1B CCW HX CCW OUTLET ISO, Q1P17V008B

_____ Initial

- Check proper flow on FI 3043CA, HX 1C CCW FLOW

_____ Initial

3.4.2 IF the 1C CCW heat exchanger is NOT in service, THEN **place** 1C CCW heat exchanger in service per Section 4.4 of FNP-1-SOP-23.0.

_____ Initial

3.5 1C CCW pump is in service prior to shifting the on service train from A Train to B Train.

_____ Initial

- IF required to place 1C CCW pump in service, THEN **perform** procedure Section 4.7

_____ Initial

Appendix 23.0B
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4.0 1A CCW PUMP AND HEAT EXCHANGER ALIGNMENT

4.1 **Verify** SW FROM 1A CCW HX Q1P16FV3009A handswitch in MOD.

_____ Initial

4.2 **Throttle** 1A CCW HX DISCH FCV HIC 3009A as necessary to control CCW temperature.

_____ Initial

4.3 **Verify** the 1A CCW HX CCW OUTLET ISO, Q1P17V008A is open.

_____ Initial

CAUTION

CCW TO 1B RHR HX Q1P17MOV3185B should remain open, while swapping the on-service train, to prevent system pressure spike when CCW trains are cross-connected during swap. (1-95-063) ☐

4.4 **Verify** open CCW TO 1B RHR HX Q1P17MOV3185B.

_____ Initial

NOTE

Minimize operating time with CCW flow > 6000 gpm. ☐

4.5 **Start** the 1A CCW PUMP if not already running in the off-service train.

_____ Initial

4.6 **Verify** proper flow on FI 3043AA, 1A CCW HX FLOW.

_____ Initial

4.7 **Monitor** CCW HX outlet temperature to ensure CCW temperature is maintained less than 105°F (120°F IF aligned for plant cooldown).

_____ Initial

Appendix 23.0B
(Page 4 of 17)

NOTES

CCW temperature should be maintained stable as possible to minimize effects on the following:

- Reactivity changes due to changes in letdown temperature
- RCP oil levels. ☐

4.8 IF time permits, THEN **allow** oncoming CCW temperature to increase to a value equal to or slightly higher than the off going train by performing the following:

4.8.1 **Monitor** the following CCW FROM CCW HX TEMP indications:

- TI-3042A ☐
- TI-3042C ☐

4.8.2 **Throttle** 1A CCW HX DISCH FCV HIC 3009A as necessary to increase oncoming CCW temperature.

_____
Initial

4.8.3 IF desired, THEN **shift** on service SFP cooling loops per FNP-1-SOP-54.0, SPENT FUEL PIT COOLING AND PURIFICATION SYSTEM.

_____
Initial

4.9 IF the actual valve alignment for the train swap is delayed, THEN CCW TO 1B RHR HX Q1P17MOV3185B may be **closed**.

_____
Initial

Appendix 23.0B
(Page 5 of 17)

CAUTIONS

- Minimize the time required to perform this section of this procedure since Trains A and B will be hydraulically cross connected during the performance of these steps.
- CCW temperature should be maintained stable as possible to minimize effects on the following:
  - Reactivity changes due to changes in letdown temperature
  - RCP oil levels. ☐

5.0 COMPONENT COOLING WATER ALIGNMENT

5.1 WHEN ready to perform valve manipulation for the train swap,
THEN **verify** CCW TO 1B RHR HX Q1P17MOV3185B OPEN. _____ Initial

5.2 **Notify** control room personnel to perform the following during CCW valve alignment:

5.2.1 **Monitor** CCW surge tank levels closely.

- CCW Surge Tank LI-3027AA ☐
- CCW Surge Tank LI-3027BA ☐

5.2.2 Be ready to **make up** to the surge tank if required. _____ Initial

5.2.3 **Monitor** the following CCW flow indications:

- FI3043AA HX 1A CCW FLOW ☐
- FI3043CA HX 1C CCW FLOW ☐

5.2.4 IF flow is lost, THEN immediately **notify** personnel performing the procedure to take corrective action. _____ Initial

5.3 **Open** CCW PUMPS SUCT HDR XCONN, Q1P17V110C. _____ Initial

5.4 **Open** CCW PUMPS SUCT HDR XCONN, Q1P17V110B. _____ Initial

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5.5 **Open** CCW PUMPS DISCH HDR XCONN, Q1P17V003A. _____ Initial

5.6 **Open** CCW PUMPS DISCH HDR XCONN, Q1P17V003B. _____ Initial

5.7 **Open** CCW SUPPLY HDR XCONN, Q1P17V009A. _____ Initial

5.8 **Open** CCW SUPPLY HDR XCONN, Q1P17V009B. _____ Initial

5.9 **Close** CCW SUPPLY HDR XCONN, Q1P17V009C. _____ Initial

5.10 **Close** CCW SUPPLY HDR XCONN, Q1P17V009D. _____ Initial

5.11 **Close** CCW PUMPS DISCH HDR XCONN, Q1P17V003C. _____ Initial

5.12 **Close** CCW PUMPS DISCH HDR XCONN, Q1P17V003D. _____ Initial

5.13 **Close** CCW PUMPS SUCT HDR XCONN, Q1P17V110D. _____ Initial

5.14 **Close** CCW PUMPS SUCT HDR XCONN, Q1P17V110E. _____ Initial

5.15 IF desired THEN CCW TO 1B RHR HX Q1P17MOV3185B may be **closed**. _____ Initial

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6.0 SERVICE WATER ALIGNMENT

6.1 **Close** 1B CCW HX A TRN SW INLET HDR ISO, Q1P16V002D. _____ Initial

6.2 **Close** 1B CCW HX A TRN SW INLET HDR ISO, Q1P16V002C. _____ Initial

6.3 **Close** 1B CCW HX A TRN SW RTN HDR ISO, Q1P16V008E. _____ Initial

6.4 **Close** 1B CCW HX A TRN SW RTN HDR ISO, Q1P16V008D. _____ Initial

6.5 **Open** 1B CCW HX B TRN SW INLET HDR ISO, Q1P16V002B. _____ Initial

6.6 **Open** 1B CCW HX B TRN SW INLET HDR ISO, Q1P16V002A. _____ Initial

6.7 **Open** 1B CCW HX B TRN SW RTN HDR ISO, Q1P16V008C. _____ Initial

6.8 **Open** 1B CCW HX B TRN SW RTN HDR ISO, Q1P16V008B. _____ Initial

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NOTES

- The miscellaneous header is now aligned to B Train.
- The off service train is normally in operation in modes 1–4 supplying the operating charging pump, with the non-operating SFP HX flowpath aligned and CCW to the RHR HX isolated. (Reference RER 1080944901) ☐

6.9 IF it is desired to secure the 1C CCW pump, THEN **check** that conditions exist to allow securing the 1C CCW pump:

6.9.1 **Check** for the following conditions:

- Spent fuel pool cooling is aligned to B Train. _____ Initial
- 1A RHR pump is NOT running. _____ Initial
- 1A charging pump or 1B charging pump (If aligned to A Train) are NOT running. _____ Initial
- No other reasons exist to maintain 1C CCW pump running. _____ Initial

6.9.2 IF above conditions are NOT met, THEN **notify** the Shift Supervisor that 1C CCW pump is required for plant operations. _____ Initial

6.9.3 IF these conditions are satisfied, THEN the 1C CCW Pump may be **stopped**. _____ Initial

6.9.4 IF the 1C CCW pump is stopped, THEN **open** CCW TO 1A RHR HX Q1P17MOV3185A. _____ Initial

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7.0 ELECTRICAL ALIGNMENT

7.1 **Perform** the following for breaker Q1R15BKRDF05:

7.1.1 **Rack-out** breaker Q1R15BKRDF05. _____ Initial

7.1.2 **Turn** key # RE-14265 in the mechanical interlock on circuit breaker Q1R15BKRDF05. _____ Initial

7.1.3 **Remove** key # RE-14265. _____ Initial

7.2 **Perform** the following for 1B CCW pump 4KV disconnect switch 1A (Q1R18A004A-A):

7.2.1 **Insert** key # RE-14265 into the mechanical interlock on 1B CCW pump 4KV disconnect switch 1A (Q1R18A004A-A). _____ Initial

7.2.2 **Turn** key # RE-14265. Key # RE-14265 is now held in place. _____ Initial

7.2.3 **Open** disconnect switch Q1R18A004A-A. _____ Initial

7.2.4 **Check** the position indicator reads SW OPEN. _____ Initial

7.2.5 With the aid of a flashlight, **perform** the following:

7.2.5.1 **Check** that a visible air gap exists between the main contacts on all three phases. _____ Initial

7.2.5.2 **Check** that a visible air gap exists between the arcing contacts on all three phases. _____ Initial

7.2.6 **Turn** key # RE-14224 in its mechanical interlock. _____ Initial

7.2.7 **Remove** key # RE-14224. 1A disconnect switch is now locked in the open position. _____ Initial

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7.3 **Perform** the following for 1B CCW pump 4KV disconnect switch 1A (Q1R18A004B-B)

7.3.1 **Insert** key # RE-14224 into its mechanical interlock on 1B CCW pump 4KV disconnect switch 1B (Q1R18A004B-B). _____ Initial

7.3.2 **Turn** key # RE-14224. Key # RE-14224 is now held in place. _____ Initial

7.3.3 **Close** disconnect switch, Q1R18A004B-B). _____ Initial

7.3.4 **Check** the position indicator reads SW CLOSED. _____ Initial

7.3.5 With the aid of a flashlight, **perform** the following:

7.3.5.1 **Check** that NO air gap exists for the main contacts on all three phases. (Contacts closed.) _____ Initial

7.3.5.2 **Check** that NO air gap exists for the arcing contacts on all three phases. (Contacts closed.) _____ Initial

7.3.6 **Turn** key # RE-14291 in its mechanical interlock. _____ Initial

7.3.7 **Remove** key # RE-14291. 1B disconnect switch is now locked in the closed position. _____ Initial

CAUTION
Breaker Q1R15BKRDG05 has alternate DC control power supplied through fuses in C-HSDP when 1B CCW PUMP LOCAL-REMOTE switch on C-HSDP is in LOCAL. ☐

7.4 **Verify** LOCAL-REMOTE switch 1B CCW PUMP B TRN Q1P17P001B on C-HSDP in REMOTE. _____ Initial

7.5 **Insert** key # RE-14291 into its mechanical interlock on circuit breaker Q1R15BKRDG05. _____ Initial

7.6 **Turn** key# RE-14291. Key # RE-14291 is now held in place. _____ Initial

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7.7 **Rack** circuit breaker Q1R15BKRDG05 to the connected position. _____ Initial

7.8 **Close** DC control power switch for Q1R15BKRDG05 and **verify** breaker spring charges. _____ Initial

7.9 1B CCW Hx and pump are now aligned to B Train, IF desired, THEN **place** 1B CCW pump and heat exchanger in service. _____ Initial

7.10 **Notify** Shift Chemist CCW on service train has been shifted from Train A to Train B. _____ Initial

NOTE

The next step preferred action is to place the 1B CCW Pump on-service.
If extenuating circumstances preclude placing the pump on-service, then bumping the pump is allowed with the shift supervisor's permission. ☐

CAUTION

CCW temperature should be maintained stable as possible to minimize effects on the following:
- Reactivity changes due to changes in letdown temperature
- RCP oil levels ☐

8.0 1B CCW PUMP OPERABILITY CHECK

8.1 **Perform** one of the following steps.

8.1.1 **Place** 1B CCW Pump in service per Section 4.7 Shifting CCW Pumps on the On-Service Train. _____ Initial

8.1.2 **Bump** 1B CCW Pump as follows:

8.1.2.1 **Open** CCW TO 1B RHR HX Q1P17MOV3185B. _____ Initial

8.1.2.2 **Bump** the 1B CCW pump. _____ Initial

8.1.2.3 **Close** CCW TO 1B RHR HX Q1P17MOV3185B. _____ Initial

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NOTE

This section does not apply unless the only intent is to check the alignment of the 1B CCW pump to the B train as directed by initial condition 3.3. ☐

9.0 1B CCW PUMP B TRAIN ALIGNMENT CHECK

9.1 IF any component is not in the expected position, THEN **report** it to the Shift Supervisor immediately.

9.2 **Check** breaker Q1R15BKRDF05 is racked out.

_____ Initial

9.3 **Check** the mechanical interlock key is removed from breaker Q1R15BKRDF05.

_____ Initial

9.4 **Check** 1B CCW pump 4KV disconnect switch 1A, Q1R18A004A-A, is locked open with mechanical interlock key #RE-14265 held in place.

_____ Initial

9.4.1 **Check** the position indicator (Q1R18A004A-A) reads SW OPEN.

_____ Initial

9.4.2 With the aid of a flashlight, **perform** the following:

9.4.2.1 **Check** that a visible air gap exists between the main contacts on all three phases.

_____ Initial

9.4.2.2 **Check** that a visible air gap exists between the arcing contacts on all three phases.

_____ Initial

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9.5 **Check** that 1B CCW pump 4KV disconnect switch 1B, Q1R18A004B-B is locked closed with mechanical interlock key #RE-14224 held in place.

_____ Initial

9.5.1 **Check** Disconnect switch Q1R18A004B-B reads “SW CLOSED.”

_____ Initial

9.5.2 With the aid of a flashlight, **perform** the following:

9.5.2.1 **Check** that NO air gap exists for the main contacts on all three phases. (Contacts closed.)

_____ Initial

9.5.2.2 **Check** that NO air gap exists for the arcing contacts on all three phases. (Contacts closed.)

_____ Initial

9.6 **Check** that 1B CCW breaker Q1R15BKRDG05 is racked to the connect position with mechanical interlock key #RE-14291 held in place.

_____ Initial

9.7 **Check** that breaker Q1R15BKRDG05 is charged.

_____ Initial

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9.8 **Check** the status of the following CCW valves.

- CCW PUMPS SUCT HDR XCONN, Q1P17V110C--Open _____ Initial
- CCW PUMPS SUCT HDR XCONN, Q1P17V110B--Open _____ Initial
- CCW PUMPS DISCH HDR XCONN, Q1P17V003A--Open _____ Initial
- CCW PUMPS DISCH HDR XCONN, Q1P17V003B--Open _____ Initial
- CCW SUPPLY HDR XCONN, Q1P17V009A—Open _____ Initial
- CCW SUPPLY HDR XCONN, Q1P17V009B--Open _____ Initial
- CCW SUPPLY HDR XCONN, Q1P17V009C--Closed _____ Initial
- CCW SUPPLY HDR XCONN, Q1P17V009D—Closed _____ Initial
- CCW PUMPS DISCH HDR XCONN, Q1P17V003C--Closed _____ Initial
- CCW PUMPS DISCH HDR XCONN, Q1P17V003D--Closed _____ Initial
- CCW PUMPS SUCT HDR XCONN, Q1P17V110D--Closed _____ Initial
- CCW PUMPS SUCT HDR XCONN, Q1P17V110E--Closed _____ Initial

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9.9 **Check** the status of the following SW valves:

- 1B CCW HX A TRN SW INLET HDR ISO, Q1P16V002D--Closed. _____ Initial
- 1B CCW HX A TRN SW INLET HDR ISO, Q1P16V002C--Closed. _____ Initial
- 1B CCW HX A TRN SW RTN HDR ISO, Q1P16V008E--Closed. _____ Initial
- 1B CCW HX A TRN SW RTN HDR ISO, Q1P16V008D--Closed. _____ Initial
- 1B CCW HX B TRN SW INLET HDR ISO, Q1P16V002B--Open _____ Initial
- 1B CCW HX B TRN SW INLET HDR ISO, Q1P16V002A--Open _____ Initial
- 1B CCW HX B TRN SW RTN HDR ISO, Q1P16V008C--Open _____ Initial
- 1B CCW HX B TRN SW RTN HDR ISO, Q1P16V008B—Open _____ Initial

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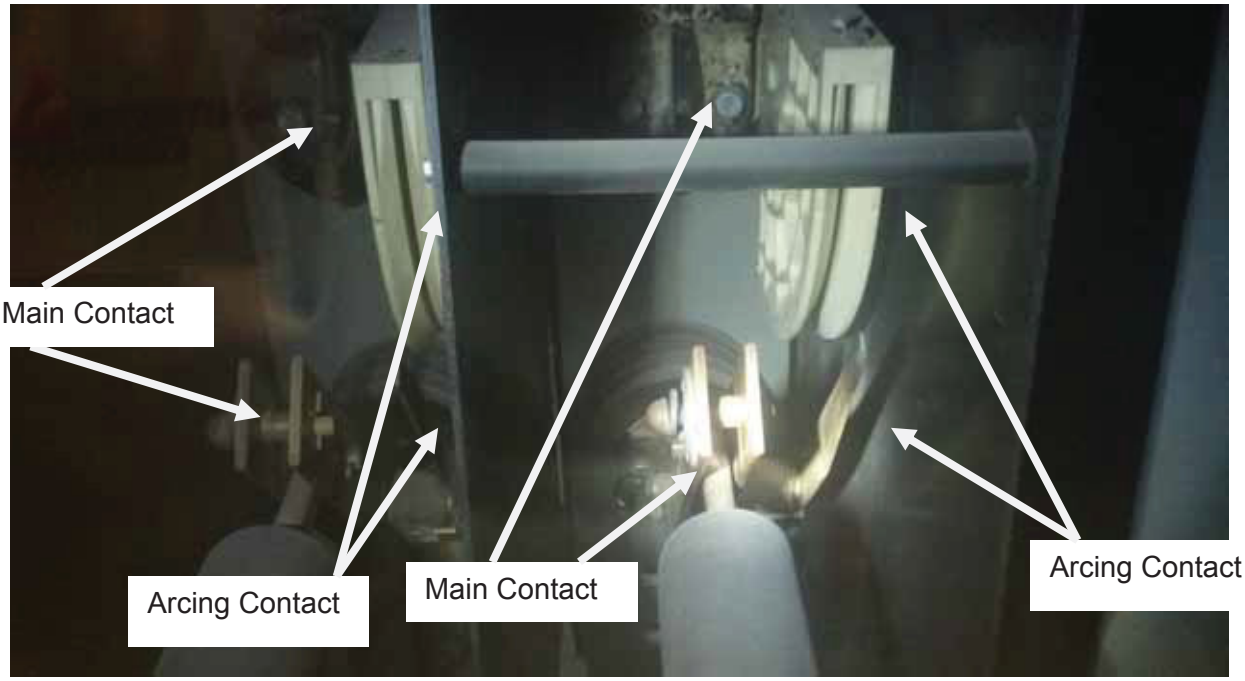
FIGURE 1

Typical 4kV Disconnect shown in OPEN condition.

Correct Contact Configuration



Two Phases shown.

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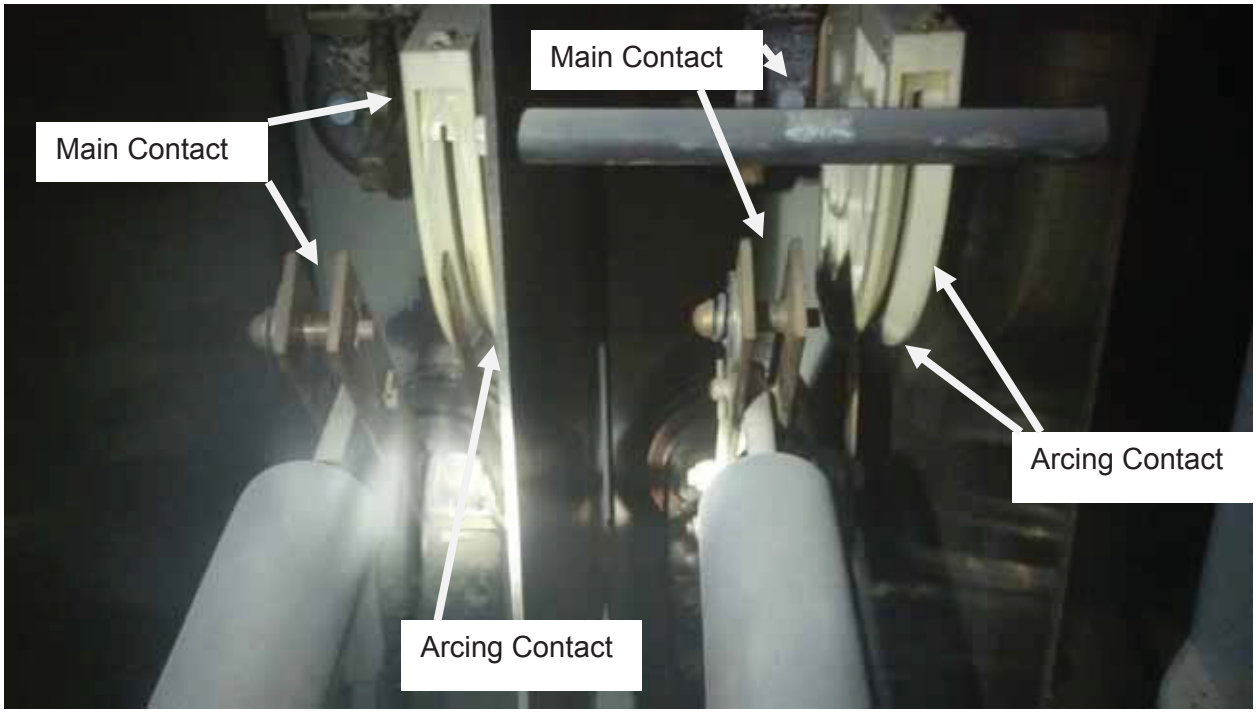
FIGURE 2

Typical 4kV Disconnect shown in OPEN condition.

Incorrect Contact Configuration



Two Phases shown.

Main contacts open but arcing contact on right is closed (no air gap)

APPENDIX 23.0C

SHIFTING ON SERVICE TRAIN
FROM TRAIN B TO TRAIN A

Performed by _____ Date _____

Verified By: _____ Date _____

Reviewed by: _____ Date _____

This appendix consists 16 pages

APPENDIX 23.0C

SHIFTING ON SERVICE TRAIN FROM B TRAIN TO A TRAIN
(Page 1 of 16)

1.0 PURPOSE

1.1 Provides guidance for shifting the on service train from B train to A train.

1.2 Provides guidance for a separate check of 1B CCW pump alignment to A train.

2.0 PRECAUTIONS AND LIMITATIONS

2.1 Shifting train alignment for 1B CCW pump and HX also shifts the miscellaneous header.

2.2 The operation of two pumps through one HX is not allowed.

2.3 CCW temperature should be maintained as stable as possible due to the effects on reactivity due to changes in letdown temperature. Also, changing CCW temperature could affect RCP oil levels which could cause level annunciators to come in. (AI 2005201097)

2.4 Minimize operating time with CCW flow > 6000 gpm.

2.5 It is desirable, if time permits, to allow the oncoming CCW temperature to increase to where it is equal or higher than the off-going train. This will minimize the reactivity effect and impact on RCP oil levels. (AI2008200245)

2.6 CCW TO 1A RHR HX Q1P17MOV3185A should remain open, while swapping the on-service train, to prevent system pressure spike when CCW trains are cross-connected during swap. (1-95-063)

2.7 In order for 1B CCW pump to be started by the ESS or LOSP sequencers; the train to which it is aligned must have the train dedicated pump supply breaker racked out.

2.8 Any operations involving manipulation of the 4kV disconnect switches associated shall include visual confirmation of the following:

2.8.1 The main contacts are in the required state, open or closed. (One contact per phase.) Refer to figure 1 and 2.

2.8.2 The arcing contacts are in the required state, open or closed. (One contact per phase.) Refer to figure 1 and 2.

3.0 INITIAL CONDITIONS

3.1 The version of this appendix has been verified to be the current version. (OR 1-98-498)

_____ Initial

3.2 The appendix has been verified to be for the correct unit for the task. (OR 1-98-498)

_____ Initial

3.3 IF only performing a line up check of 1B CCW pump to A train, THEN **perform** Section 9.0 of the appendix and the remaining portion of the appendix is N/A.

_____ Initial

3.4 1A CCW heat exchanger is in service prior to shifting the on service train from "B" Train to A Train.

3.4.1 IF the 1A CCW heat exchanger is in service, THEN **check** the following:

- **Check** open 1A CCW HX CCW OUTLET ISO, Q1P17V008A.

_____ Initial

- **Check** closed 1B CCW HX CCW OUTLET ISO, Q1P17V008B

_____ Initial

- **Check** proper flow on FI 3043AA, HX 1ACCW FLOW.

_____ Initial

3.4.2 IF the 1A CCW heat exchanger is NOT in service, THEN **place** 1A CCW heat exchanger in service per Section 4.6 of FNP-1-SOP-23.0.

_____ Initial

3.5 1A CCW pump is in service prior to shifting the on service train from "B" Train to A Train.

_____ Initial

3.5.1 IF required to place 1A CCW pump in service, THEN **perform** procedure Section 4.7.

_____ Initial

APPENDIX 23.0C

SHIFTING ON SERVICE TRAIN FROM B TRAIN TO A TRAIN
(Page 3 of 16)

4.0 1C CCW PUMP AND HEAT EXCHANGER ALIGNMENT

4.1 **Verify** SW FROM 1C CCW HX Q1P16FV3009C handswitch in MOD. _____ Initial

4.2 **Throttle** 1C CCW HX DISCH FCV HIC 3009C as necessary to control CCW temperature. _____ Initial

4.3 **Verify** the 1C CCW HX CCW OUTLET ISO, Q1P17V008C is open. _____ Initial

CAUTION

CCW TO 1A RHR HX Q1P17MOV3185A should remain open, while swapping the on-service train, to prevent system pressure spike when CCW trains are cross-connected during swap. (1-95-063) ☐

4.4 **Verify** open CCW TO 1A RHR HX Q1P17MOV3185A. _____ Initial

NOTE

Minimize operating time with CCW flow > 6000 gpm. ☐

4.5 **Start** the 1C CCW PUMP if not already running in the off-service train. _____ Initial

4.6 **Verify** proper flow on FI 3043CA, 1C CCW HX FLOW. _____ Initial

4.7 **Monitor** CCW HX outlet temperature to ensure CCW temperature is maintained less than 105°F (120°F IF aligned for plant cooldown). _____ Initial

APPENDIX 23.0C

SHIFTING ON SERVICE TRAIN FROM B TRAIN TO A TRAIN
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NOTE

The following actions will minimize the reactivity effect and impact on RCP oil levels. ☐

4.8 IF time permits, THEN **allow** oncoming CCW temperature to increase to a value equal to or slightly higher than the off going train by performing the following:

Initial

4.8.1 **Monitor** the following CCW FROM CCW HX TEMP indications:

- TI-3042A ☐
- TI-3042C ☐

4.8.2 **Throttle** 1C CCW HX DISCH FCV HIC 3009C as necessary to increase oncoming CCW temperature.

Initial

4.8.3 IF desired, THEN **shift** on service SFP cooling loops per FNP-1-SOP-54.0, SPENT FUEL PIT COOLING AND PURIFICATION SYSTEM.

Initial

4.9 IF the actual valve alignment for the train swap is delayed, THEN CCW TO 1A RHR HX Q1P17MOV3185A may be closed.

Initial

CAUTIONS

Minimize the time required to perform this section of this procedure since Trains A and B will be hydraulically cross connected during the performance of these steps.
CCW temperature should be maintained stable as possible to minimize effects on the following:
Reactivity changes due to changes in letdown temperature
RCP oil levels. ☐

APPENDIX 23.0C

SHIFTING ON SERVICE TRAIN FROM B TRAIN TO A TRAIN
(Page 5 of 16)

5.0 COMPONENT COOLING WATER ALIGNMENT

5.1 WHEN ready to perform valve manipulation for the train swap, THEN **verify** open CCW TO 1A RHR HX Q1P17MOV3185A.

Initial

5.2 **Notify** control room personnel to perform the following during CCW valve alignment, as required:

Initial

5.2.1 **Monitor** CCW surge tank levels closely.

- CCW Surge Tank LI-3027AA ☐
- CCW Surge Tank LI-3027BA ☐

5.2.2 **Be** ready to make up to the surge tank if required.

Initial

5.2.3 **Monitor** the following CCW flow indications:

- FI3043AA HX 1A CCW FLOW ☐
- FI3043CA HX 1C CCW FLOW ☐

5.2.4 IF flow is lost, THEN immediately **notify** personnel performing the procedure to take corrective action.

Initial

5.3 **Open** CCW PUMPS SUCT HDR XCONN, Q1P17V110D.

Initial

5.4 **Open** CCW PUMPS SUCT HDR XCONN, Q1P17V110E.

Initial

5.5 **Open** CCW PUMPS DISCH HDR XCONN, Q1P17V003D.

Initial

5.6 **Open** CCW PUMPS DISCH HDR XCONN, Q1P17V003C.

Initial

5.7 **Open** CCW SUPPLY HDR XCONN, Q1P17V009C.

Initial

5.8 **Open** CCW SUPPLY HDR XCONN, Q1P17V009D.

Initial

5.9 **Close** CCW SUPPLY HDR XCONN, Q1P17V009B.

Initial

APPENDIX 23.0C

SHIFTING ON SERVICE TRAIN FROM B TRAIN TO A TRAIN
(Page 6 of 16)

5.10 **Close** CCW SUPPLY HDR XCONN, Q1P17V009A. _____ Initial

5.11 **Close** CCW PUMPS DISCH HDR XCONN, Q1P17V003A. _____ Initial

5.12 **Close** CCW PUMPS DISCH HDR XCONN, Q1P17V003B. _____ Initial

5.13 **Close** CCW PUMPS SUCT HDR XCONN, Q1P17V110B. _____ Initial

5.14 **Close** CCW PUMPS SUCT HDR XCONN, Q1P17V110C. _____ Initial

5.15 IF desired THEN **close** CCW TO 1A RHR HX Q1P17MOV3185A. _____ Initial

6.0 SERVICE WATER ALIGNMENT

6.1 **Close** 1B CCW HX B TRN SW INLET HDR ISO, Q1P16V002B. _____ Initial

6.2 **Close** 1B CCW HX B TRN SW INLET HDR ISO, Q1P16V002A. _____ Initial

6.3 **Close** 1B CCW HX B TRN SW RTN HDR ISO, Q1P16V008C. _____ Initial

6.4 **Close** 1B CCW HX B TRN SW RTN HDR ISO, Q1P16V008B. _____ Initial

6.5 **Open** 1B CCW HX A TRN SW INLET HDR ISO, Q1P16V002D. _____ Initial

6.6 **Open** 1B CCW HX A TRN SW INLET HDR ISO, Q1P16V002C. _____ Initial

6.7 **Open** 1B CCW HX A TRN SW RTN HDR ISO, Q1P16V008E. _____ Initial

6.8 **Open** 1B CCW HX A TRN SW RTN HDR ISO, Q1P16V008D. _____ Initial

APPENDIX 23.0C

SHIFTING ON SERVICE TRAIN FROM B TRAIN TO A TRAIN
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NOTES

- The miscellaneous header is now aligned to A Train.
- The off service train is normally in operation in modes 1–4 supplying the operating charging pump, with the non-operating SFP HX flowpath aligned and CCW to the RHR HX isolated. (Reference RER 1080944901) ☐

6.9 IF it is desired to secure the 1A CCW pump, THEN **check** that conditions exist to allow securing the 1A CCW pump. ☐

6.9.1 **Check** for the following conditions:

- Spent fuel pool cooling is aligned to A Train. _____ Initial
- 1B RHR pump is NOT running. _____ Initial
- 1C charging pump or 1B charging pump (If aligned to B Train) are NOT running. _____ Initial
- No other reasons exist to maintain 1A CCW pump running. _____ Initial

6.9.2 IF above conditions are NOT met, THEN **notify** the Shift Supervisor that 1A CCW pump is required for plant operations _____ Initial

6.9.3 IF these conditions are satisfied, THEN the 1A CCW Pump may be stopped. _____ Initial

6.9.4 IF the 1A CCW pump is stopped, THEN **open** CCW TO 1B RHR HX Q1P17MOV3185B. _____ Initial

7.0 ELECTRICAL ALIGNMENT

CAUTION
Breaker Q1R15BKRDG05 has alternate DC control power supplied through fuses in C-HSDP when 1B CCW PUMP LOCAL-REMOTE switch on C-HSDP is in LOCAL. ☐

7.1 **Verify** LOCAL-REMOTE switch on C-HSDP for 1B CCW PUMP in REMOTE.

_____ Initial

7.2 **Perform** the following for breaker Q1R15BKRDG05:

7.2.1 **Rackout** breaker Q1R15BKRDG05.

_____ Initial

7.2.2 **Turn** key #RE-14291 in the mechanical interlock on circuit breaker Q1R15BKRDG05.

_____ Initial

7.2.3 **Remove** key #RE-14291.

_____ Initial

7.3 **Perform** the following for 1B CCW pump 4KV disconnect switch 1B (Q1R18A004B-B).

7.3.1 **Insert** key #RE-14291 into the mechanical interlock on 1B CCW pump 4KV disconnect switch 1B (Q1R18A004B-B).

_____ Initial

7.3.2 **Turn** key #RE-14291. Key #RE-14291 is now held in place.

_____ Initial

7.3.3 **Open** disconnect switch Q1R18A004B-B.

_____ Initial

7.3.4 **Check** the position indicator reads SW OPEN.

_____ Initial

7.3.5 With the aid of a flashlight, **perform** the following:

7.3.5.1 **Check** that a visible air gap exists between the main contacts on all three phases.

_____ Initial

7.3.5.2 **Check** that a visible air gap exists between the arcing contacts on all three phases.

_____ Initial

APPENDIX 23.0C

SHIFTING ON SERVICE TRAIN FROM B TRAIN TO A TRAIN
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7.3.6 **Turn** key #RE-14224 in its mechanical interlock on 1B disconnect switch.

_____ Initial

7.3.7 **Remove** key #RE-14224. 1B disconnect switch is now locked in the open position.

_____ Initial

7.4 **Perform** the following for 1B CCW pump 4 KV disconnect switch 1A (Q1R18A004A-A).

7.4.1 **Insert** key #RE-14224 into its mechanical interlock on 1B CCW pump 4 KV disconnect switch 1A (Q1R18A004A-A).

_____ Initial

7.4.2 **Turn** key #RE-14224. Key E-14224 is held in place.

_____ Initial

7.4.3 **Close** disconnect switch, Q1R18A004A-A.

_____ Initial

7.4.4 **Check** the position indicator reads SW CLOSED.

_____ Initial

7.4.5 With the aid of a flashlight, **perform** the following:

7.4.5.1 **Check** that NO air gap exists for the main contacts on all three phases. (Contacts closed.)

_____ Initial

7.4.5.2 **Check** that NO air gap exists for the arcing contacts on all three phases. (Contacts closed.)

_____ Initial

7.4.6 **Turn** key #RE-14265 in its mechanical interlock.

_____ Initial

7.4.7 **Remove** key #RE-14265. 1A disconnect switch is now locked in the closed position.

_____ Initial

7.5 **Insert** key #RE-14265 into its mechanical interlock on circuit breaker Q1R15BKRDF05.

_____ Initial

7.6 **Turn** key #RE-14265. Key #RE-14265 is now held in place.

_____ Initial

7.7 **Rack** circuit breaker Q1R15BKRDF05 to the connected position.

_____ Initial

APPENDIX 23.0C

SHIFTING ON SERVICE TRAIN FROM B TRAIN TO A TRAIN
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7.8 **Close** DC control power switch for Q1R15BKRDF05 and **verify** breaker spring charges.

_____ Initial

7.9 1B CCW HX and pump are now aligned to A Train, IF desired, THEN **place** 1B CCW pump and heat exchanger in service.

_____ Initial

7.10 **Notify** Shift Chemist CCW on service train has been shifted from Train B to Train A.

_____ Initial

NOTE

The next step preferred action is to place the 1B CCW Pump on-service. If extenuating circumstances preclude placing the pump on-service, then bumping the pump is allowed with the shift supervisor's permission. ☐

CAUTIONS

CCW temperature should be maintained stable as possible to minimize effects on:
- Reactivity changes due to changes in letdown temperature
- RCP oil levels ☐

8.0 1B CCW PUMP OPERABILITY CHECK

8.1 **Perform** one of the following steps:

8.1.1 **Place** 1B CCW Pump in service per Section 4.7 Shifting CCW Pumps on the On-Service Train.

_____ Initial

8.1.2 **Bump** 1B CCW Pump as follows:

8.1.2.1 **Verify** open CCW TO 1A RHR HX Q1P17MOV3185A.

_____ Initial

8.1.2.2 **Bump** the 1B CCW pump.

_____ Initial

8.1.2.3 **Close** CCW TO 1A RHR HX Q1P17MOV3185A.

_____ Initial

APPENDIX 23.0C

SHIFTING ON SERVICE TRAIN FROM B TRAIN TO A TRAIN
(Page 11 of 16)

NOTE

This section does not apply unless the only intent is to check the alignment of the 1B CCW pump to the A train as directed by initial condition 3.3. ☐

9.0 CHECK 1B CCW PUMP ALIGNMENT TO A TRAIN

9.1 IF any component is not in the expected position, THEN **report** it to the Shift Supervisor immediately.

_____ Initial

9.2 **Check** breaker Q1R15BKRDG05 is racked out.

_____ Initial

9.3 **Check** the mechanical interlock key is removed from breaker Q1R15BKRDG05.

_____ Initial

9.4 **Check** 1B CCW pump 4KV disconnect switch 1A, Q1R18A004B-B, is LOCKED OPEN with mechanical interlock key #RE-14291 held in place.

_____ Initial

9.4.1 **Check** the position indicator Q1R18A004B-B reads SW OPEN.

_____ Initial

9.4.2 With the aid of a flashlight, **perform** the following:

9.4.2.1 **Check** that a visible air gap exists between the main contacts on all three phases.

_____ Initial

9.4.2.2 **Check** that a visible air gap exists between the arcing contacts on all three phases.

_____ Initial

APPENDIX 23.0C

SHIFTING ON SERVICE TRAIN FROM B TRAIN TO A TRAIN
(Page 12 of 16)

9.5 **Check** 1B CCW pump 4KV disconnect switch 1A, Q1R18A004A-A is LOCKED CLOSED with mechanical interlock key #RE-14224 in place.

_____ Initial

9.5.1 **Check** the position indicator Q1R18A004B-B reads SW CLOSED.

_____ Initial

9.5.2 With the aid of a flashlight, **perform** the following:

9.5.2.1 **Check** that NO air gap exists for the main contacts on all three phases. (Contacts closed.)

_____ Initial

9.5.2.2 **Check** that NO air gap exists for the arcing contacts on all three phases. (Contacts closed.)

_____ Initial

9.6 **Check** 1B CCW breaker Q1R15BKRDF05 is racked to the connect position with mechanical interlock key #RE-14265 held in place.

_____ Initial

9.7 **Check** that breaker Q1R15BKRDF05 is charged.

_____ Initial

APPENDIX 23.0C

SHIFTING ON SERVICE TRAIN FROM B TRAIN TO A TRAIN
(Page 13 of 16)

9.8 **Check** the status of the following CCW valves.

- CCW PUMPS SUCT HDR XCONN, Q1P17V110D-Open _____ Initial
- CCW PUMPS SUCT HDR XCONN, Q1P17V110E--Open _____ Initial
- CCW PUMPS DISCH HDR XCONN, Q1P17V003D--Open _____ Initial
- CCW PUMPS DISCH HDR XCONN, Q1P17V003C--Open _____ Initial
- CCW PUMPS DISCH HDR XCONN, Q1P17V003C--Open _____ Initial
- CCW SUPPLY HDR XCONN, Q1P17V009C--Open _____ Initial
- CCW SUPPLY HDR XCONN, Q1P17V009D--Open _____ Initial
- CCW SUPPLY HDR XCONN, Q1P17V009B--Close _____ Initial
- CCW SUPPLY HDR XCONN, Q1P17V009A--Close _____ Initial
- CCW PUMPS DISCH HDR XCONN, Q1P17V003A--Close _____ Initial
- CCW PUMPS DISCH HDR XCONN, Q1P17V003B--Close _____ Initial
- CCW PUMPS SUCT HDR XCONN, Q1P17V110B--Close _____ Initial
- CCW PUMPS SUCT HDR XCONN, Q1P17V110C--Close _____ Initial

APPENDIX 23.0C

SHIFTING ON SERVICE TRAIN FROM B TRAIN TO A TRAIN
(Page 14 of 16)

9.9 **Check** the status of the following SW valves.

- 1B CCW HX B TRN SW INLET HDR ISO, Q1P16V002B--Close _____ Initial
- 1B CCW HX B TRN SW INLET HDR ISO, Q1P16V002A--Close _____ Initial
- 1B CCW HX B TRN SW RTN HDR ISO, Q1P16V008C--Close _____ Initial
- 1B CCW HX B TRN SW RTN HDR ISO, Q1P16V008B--Close _____ Initial
- 1B CCW HX A TRN SW INLET HDR ISO, Q1P16V002D--Open _____ Initial
- 1B CCW HX A TRN SW INLET HDR ISO, Q1P16V002C--Open _____ Initial
- 1B CCW HX A TRN SW RTN HDR ISO, Q1P16V008E--Open _____ Initial
- 1B CCW HX A TRN SW RTN HDR ISO, Q1P16V008D --Open _____ Initial

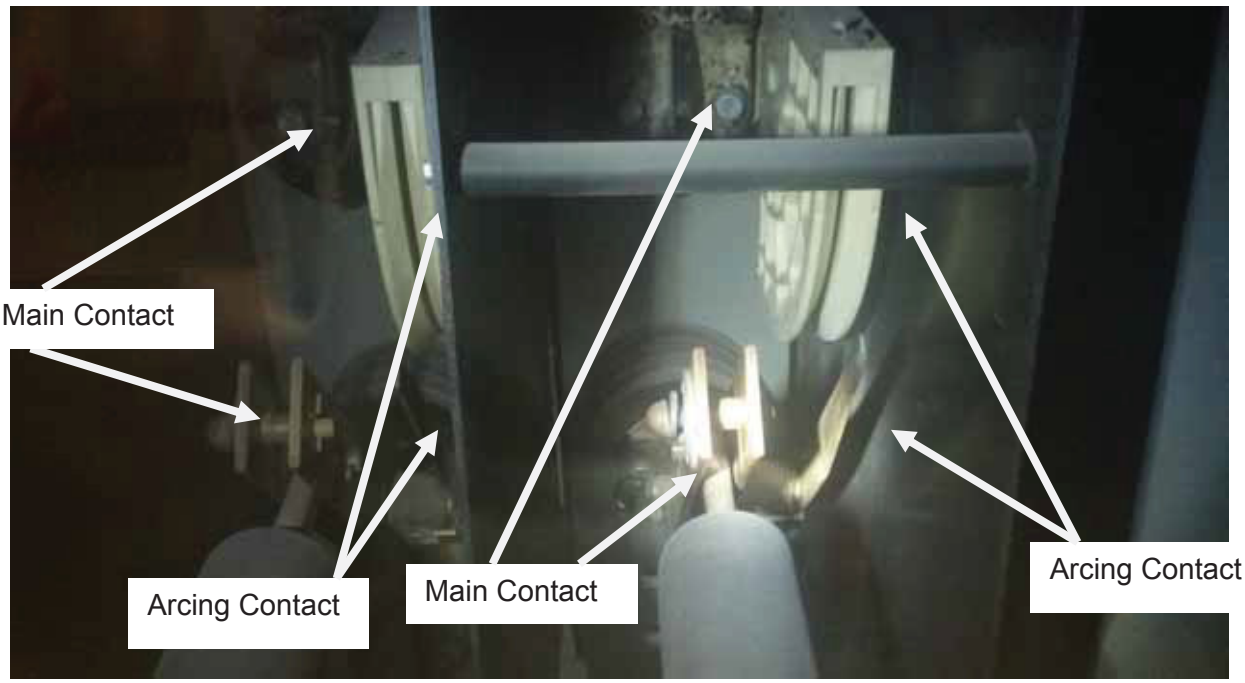
APPENDIX 23.0C

SHIFTING ON SERVICE TRAIN FROM B TRAIN TO A TRAIN
Page 15 of 16

FIGURE 1

Typical 4kV Disconnect shown in OPEN condition.

Correct Contact Configuration



Two Phases shown.

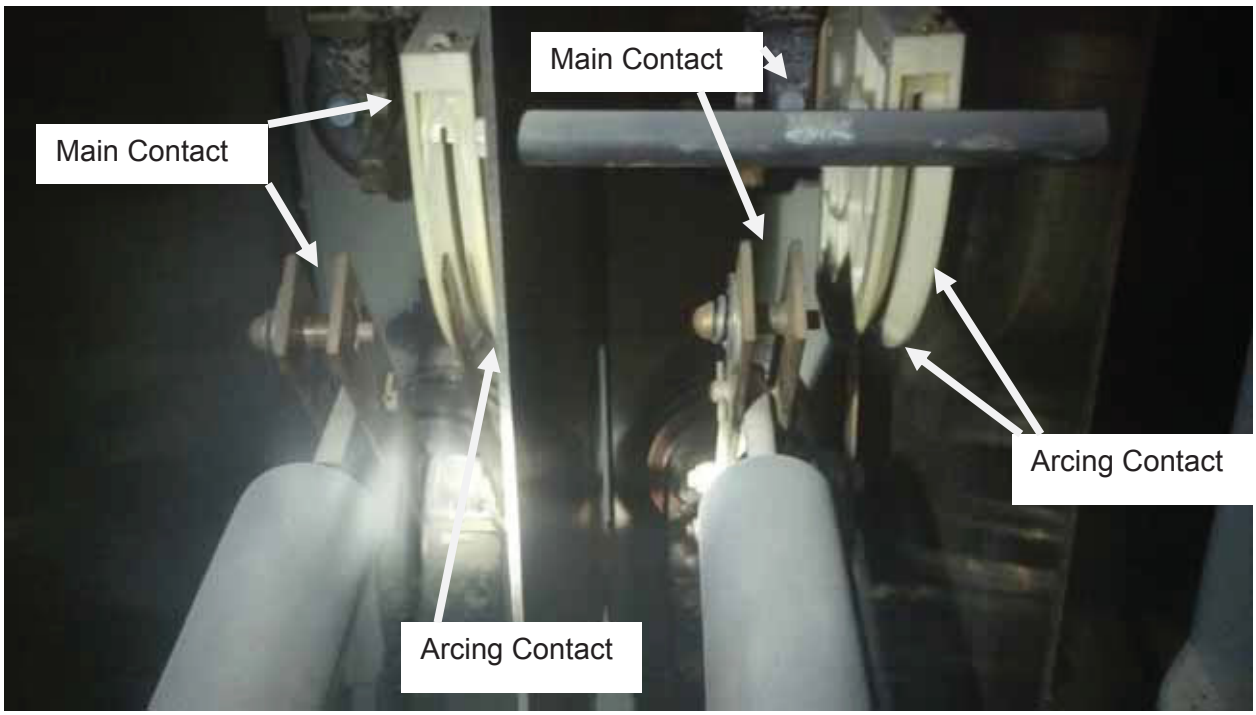
APPENDIX 23.0C

SHIFTING ON SERVICE TRAIN FROM B TRAIN TO A TRAIN
Page 16 of 16

FIGURE 2

Typical 4kV Disconnect shown in OPEN condition.

Incorrect Contact Configuration



Two Phases shown.

Main contacts open but arcing contact on right is closed (no air gap)

APPENDIX 1

B TRAIN CCW SURGE TANK FEED AND BLEED

Performed by: _____ Date _____

Verified by: _____ Date _____

Reviewed by: _____ Date _____

This appendix consists of 7 pages

APPENDIX 1

B TRAIN CCW SURGE TANK FEED AND BLEED
(Page 1 of 7)

1.0 PURPOSE

This appendix provides guidance for the feed and bleed evolution of the Unit One B Train Component Cooling Water (CCW) System.

2.0 PRECAUTIONS AND LIMITATIONS

2.1 Continuously monitor CCW Surge Tank level. IF CCW Surge Tank level can NOT be maintained between 35" to 48", THEN suspend feed and bleed activities.

2.2 Frequently monitor Floor Drain Tank level during feed and bleed.

2.3 Close CCW from 1A SFP HX vent, Q1P17V015A, immediately upon notification by Control Room or sounding of Plant Emergency Alarm.

2.4 Only one chemical mixing isolation may be open at any time. Simultaneous opening of chemical mixing isolations in opposite trains will result in a loss of two independent CCW loops due to cross-connecting trains through the mixing valves.

2.5 To extend the life of resin, temporary demineralizers should be isolated with water maintained in them when not in use.

2.6 All components used for this connection are required to be pressure tested to 150 psig which provides assurance that the system can withstand CCW system pressure. All hoses are to have banded fittings.

2.7 To preclude the risk of NPDES non-compliance, the discharge from the temporary demineralizer will be contained in drums or other suitable container until completion of Chemistry sample results. Once Chemistry has confirmed that the demin effluent is acceptable for release to the environment, discharge to the environment may take place.

3.0 INITIAL CONDITIONS

3.1 Procedures Verifications (OR 1-98-498)

3.1.1 The version of this procedure has been verified to be the current version. _____ Initial

3.1.2 The procedure has been verified to be the correct unit for the task. _____ Initial

3.2 Individuals have been briefed by the Shift Supervisor and are aware that unavailability time' will be accumulated for the duration of this appendix. An Admin. LCO has been generated. (LCO 3.7.7) _____ SS Initial

APPENDIX 1

B TRAIN CCW SURGE TANK FEED AND BLEED
(Page 2 of 7)

3.3 A Train CCW is the on-service train.

_____ Initial

3.4 "B" Train CCW is operating supplying flow to 1A SFP HX.

_____ Initial

3.5 Connect a hose pressure tested to 150 psi from CCW to 1A SFP HX vent, Q1P17V015A to inlet throttle valve attached to temporary demineralizers.

_____ Initial

3.6 Direct communication is established between the Control Room and Temporary Demineralizer area (New Fuel area).

_____ Initial

3.7 Establish communication between control room and demin water to surge tank makeup valve.

_____ Initial

3.8 A Train RHR Pump, Charging Pump, Service Water Pump and Diesel Generators operable.

_____ Initial

3.9 Temporary demin liner aligned, and ready for processing, per Figure 1.

_____ Initial

3.10 Suitable container(s) available to receive the demin effluent.

_____ Initial

APPENDIX 1

B TRAIN CCW SURGE TANK FEED AND BLEED
(Page 3 of 7)

4.0 INSTRUCTIONS

4.1 **Notify** Chemistry personnel CCW feed and bleed is commencing.

_____ Initial

CAUTION
Only one chemical mixing isolation may be open at any time. Simultaneous opening of chemical mixing isolations in opposite trains will result in a loss of two independent CCW loops due to cross-connecting trains through the mixing valves. ☐

4.2 **Open** the chemical mixing valve for the running B Train CCW pump as follows:

4.2.1 **Verify** CCW SRG TK CHEM ADD, Q1P17V114 CLOSED.

_____ Initial

4.2.2 **Check** 1A CCW PUMP RUNNING.

_____ Initial

4.2.3 **Verify** 1C CCW PUMP CHEM MIXING ISO,Q1P17V278C CLOSED.

_____ Initial

4.2.4 **Verify** 1B CCW PUMP CHEM MIXING ISO,Q1P17V278B CLOSED.

_____ Initial

4.2.5 **Open** 1A CCW PUMP CHEM MIXING ISO, Q1P17V278A.

_____ Initial

4.2.6 **Close** CCW SRG TK DEMIN INLET ISO, N1P11V045.

_____ Initial

APPENDIX 1

B TRAIN CCW SURGE TANK FEED AND BLEED
(Page 4 of 7)

4.3 **Open** MKUP TO CCW FROM DW STOR TK Q1P17MOV3030B. _____ Initial

4.4 **Verify** inlet and outlet valve attached to the temporary demineralizers CLOSED. _____ Initial

4.5 **Open** CCW from 1A SFP HX vent Q1P17V015A. _____ Initial

CAUTION

Steps 4.6 and 4.7 should be performed simultaneously to maintain CCW Surge Tank between 35" to 48" while obtaining a feed and bleed flow rate of approximately 20 gpm. ☐

4.6 **Throttle** CCW SRG TK DEMIN INLET ISO, N1P11V045 as required to provide makeup flow slightly greater than bleed flow so that level can be controlled by cycling makeup MOV at infrequent intervals. (minimizing valve cycles lessens the possibility of tripping overloads in supply breaker.) _____ Initial

4.7 **Open** outlet valve and **throttle** open inlet valve attached to the temporary demineralizer as required. _____ Initial

NOTE

To monitor demineralizer effluent place a sheet of white paper behind the effluent path for comparison to verify water is clear with no yellow tint. ☐

4.8 Frequently **monitor** the demineralizer effluent. **Secure** feed & bleed if yellow water is detected. _____ Initial

4.9 WHEN the approximate amount of gallons have been fed and bled according to CHM instructions, THEN **close** the following valves:

4.9.1 CCW from 1A SFP HX vent Q1P17V015A _____ Initial

4.9.2 MKUP TO CCW FROM DW STOR TK Q1P17MOV3030B _____ Initial

4.9.3 Inlet valve attached to the temporary demineralizers _____ Initial

4.9.4 Outlet valve attached to the temporary demineralizers _____ Initial

APPENDIX 1

B TRAIN CCW SURGE TANK FEED AND BLEED
(Page 5 of 7)

4.10 **Open** CCW SRG TK DEMIN INLET ISO, N1P11V045.

_____ Initial

4.11 **Notify** Chemistry personnel CCW feed and bleed evolution is secured.

_____ Initial

4.12 **Remove** the temporary hose connection Q1P17V015A, CCW from 1A SFP HX vent.

_____ Initial

4.13 **Replace** the cap downstream of Q1P17V015A, CCW from 1A SFP HX vent.

_____ Initial

4.14 WHEN chemical mixing is no longer required, THEN **close** 1A CCW PUMP CHEM MIXING ISO, Q1P17V278A.

_____ Initial

4.15 **INDEPENDENTLY VERIFY** the following valves are CLOSED:

4.15.1 CCW from 1A SFP HX vent Q1P17V015A

_____ Initial

4.15.2 MKUP TO CCW FROM DW STOR TK Q1P17MOV3030B

_____ Initial

4.15.3 1A CCW PUMP CHEM MIXING ISO, Q1P17V278A

_____ Initial

4.16 **INDEPENDENTLY VERIFY** that CCW SRG TK DEMIN INLET ISO, N1P11V045 is OPEN.

_____ Initial

APPENDIX 1

B TRAIN CCW SURGE TANK FEED AND BLEED
(Page 6 of 7)

4.17 **Attach** label(s) to any container(s) containing the processed effluent. _____

4.17.1 The labels should **include** the following:

- Date / Time stamp from this appendix. _____
- Source of CCW processed. _____
- Date Chemistry sample requested. _____

4.18 Request Chemistry **perform** sample analysis of the demin effluent stored in the temporary container(s). _____

4.19 WHEN Chemistry sample analysis has been obtained, THEN **perform** the following as applicable.

4.19.1 IF the sample results are satisfactory for disposal, THEN **pump** the contents of the containers labeled per step 4.17 into the nearest sump for processing. _____

4.19.2 IF the sample results indicated further processing, THEN **perform** the following:

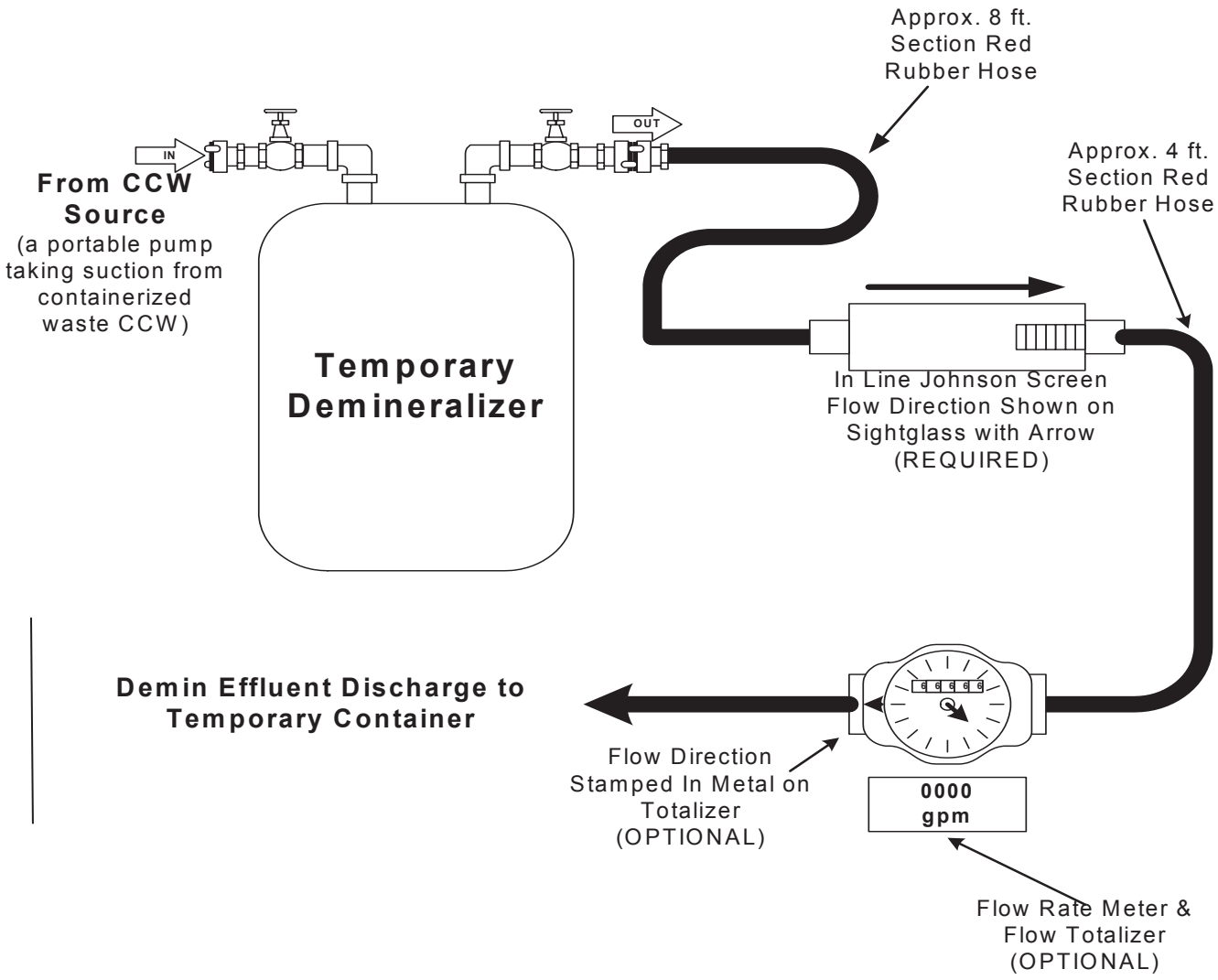
4.19.2.1 **Contact** Operations Supervision for guidance as to how to process the contents of the containers. _____

4.19.2.2 **Remove** all labels attached per step 4.17. _____

4.20 **Label** the containers to be processed as necessary to prevent inadvertent disposal. _____

APPENDIX 1

B TRAIN CCW SURGE TANK FEED AND BLEED
(Page 7 of 7)



NOTE:
The in line Johnson Screen serves as an additional barrier to prevent putting resin into the floor drain system. The temporary demineralizer should not be placed in service without it. The flow indicator and totalizer are optional depending on the need to monitor flowrate and total gallons processed.

APPENDIX 2

A TRAIN CCW SURGE TANK FEED AND BLEED

Performed by: _____ Date _____

Verified by: _____ Date _____

Reviewed by: _____ Date _____

This appendix consists of 6 pages

APPENDIX 2

A TRAIN CCW SURGE TANK FEED AND BLEED
(Page 1 of 6)

1.0 PURPOSE

This appendix provides guidance for the feed and bleed evolution of the Unit One A Train Component Cooling Water (CCW) System.

2.0 PRECAUTIONS AND LIMITATIONS

2.1 Continuously monitor CCW Surge Tank level. IF CCW Surge Tank level can NOT be maintained between 35" to 48", THEN suspend feed and bleed activities.

2.2 Frequently monitor Floor Drain Tank level during feed and bleed.

2.3 Close 1B SFP HX CCW OUTLET LINE VT, Q1P17V015B, immediately upon notification by Control Room or sounding of Plant Emergency Alarm.

2.4 Only one chemical mixing isolation may be open at any time. Simultaneous opening of chemical mixing isolations in opposite trains will result in a loss of two independent CCW loops due to cross-connecting trains through the mixing valves.

2.5 To extend the life of resin, temporary demineralizers should be isolated with water maintained in them when not in use.

2.6 All components used for this connection are required to be pressure tested to 150 psig which provides assurance that the system can withstand CCW system pressure. All hoses are to have banded fittings.

2.7 To preclude the risk of NPDES non-compliance, the discharge from the temporary demineralizer will be contained in drums or other suitable container until completion of Chemistry sample results. Once Chemistry has confirmed that the demin effluent is acceptable for release to the environment, discharge to the environment may take place.

3.0 INITIAL CONDITIONS

3.1 Procedures Verifications (OR 1-98-498)

3.1.1 The version of this procedure has been verified to be the current version. _____ Initial

3.1.2 The procedure has been verified to be the correct unit for the task. _____ Initial

3.2 Individuals have been briefed by the Shift Supervisor and are aware that unavailability time' will be accumulated for the duration of this appendix. An Admin. LCO has been generated. (LCO 3.7.7) _____ SS Initial

APPENDIX 2

A TRAIN CCW SURGE TANK FEED AND BLEED
(Page 2 of 6)

3.3 "B" Train CCW is the on-service train. _____ Initial

3.4 A Train CCW is operating supplying flow to 1B SFP HX. _____ Initial

3.5 **Connect** a hose pressure tested to 150 psi from 1B SFP HX CCW OUTLET LINE VT, Q1P17V015B to inlet throttle valve attached to temporary demineralizer. _____ Initial

3.6 **Direct** communication is established between the Control Room and Temporary Demineralizer area (New Fuel area). _____ Initial

3.7 **Establish** communication between control room and demin water to surge tank makeup valve. _____ Initial

3.8 "B" Train RHR Pump, Charging Pump, Service Water Pump and Diesel Generators operable. _____ Initial

3.9 Temporary demin liner aligned, and ready for processing, per Figure 1. _____ Initial

3.10 Suitable container(s) **available** to receive the demin effluent. _____ Initial

APPENDIX 2

A TRAIN CCW SURGE TANK FEED AND BLEED
(Page 3 of 6)

4.0 INSTRUCTIONS

4.1 **Notify** Chemistry personnel CCW feed and bleed is commencing.

_____ Initial

CAUTION
Only one chemical mixing isolation may be open at any time. Simultaneous opening of chemical mixing isolations in opposite trains will result in a loss of two independent CCW loops due to cross-connecting trains through the mixing valves. ☐

4.2 **Open** the chemical mixing valve for the running A Train CCW pump as follows:

4.2.1 **Verify** closed CCW SRG TK CHEM ADD, Q1P17V114.

_____ Initial

4.2.2 **Check** running the 1C CCW PUMP.

_____ Initial

4.2.3 **Verify** closed 1A CCW PUMP CHEM MIXING ISO, Q1P17V278A.

_____ Initial

4.2.4 **Verify** closed 1B CCW PUMP CHEM MIXING ISO, Q1P17V278B.

_____ Initial

4.2.5 **Open** 1C CCW PUMP CHEM MIXING ISO, Q1P17V278C.

_____ Initial

4.2.6 **Close** CCW SRG TK DEMIN INLET ISO, N1P11V045.

_____ Initial

4.3 **Open** MKUP TO CCW FROM DW STOR TK Q1P17MOV3030A.

_____ Initial

4.4 **Verify** closed inlet and outlet valves attached to the temporary demineralizers.

_____ Initial

4.5 **Open** 1B SFP HX CCW OUTLET LINE VT, Q1P17V015B.

_____ Initial

APPENDIX 2

A TRAIN CCW SURGE TANK FEED AND BLEED
(Page 4 of 6)

CAUTION

Steps 4.6 and 4.7 should be performed simultaneously to maintain CCW Surge Tank between 35" to 48" while obtaining a feed and bleed flow rate of approximately 20 gpm. ☐

4.6 **Throttle** CCW SRG TK DEMIN INLET ISO, N1P11V045 as required to provide makeup flow slightly greater than bleed flow so that level can be controlled by cycling makeup MOV at infrequent intervals. (minimizing valve cycles lessens the possibility of tripping overloads in supply breaker.)

_____ Initial

4.7 **Open** outlet valve and throttle open inlet valve attached to the temporary demineralizer as required.

_____ Initial

NOTE

To monitor demineralizer effluent, place a sheet of white paper behind the effluent path for comparison to verify water is clear with no yellow tint. ☐

4.8 Frequently **monitor** demineralizer effluent. **Secure** feed and bleed if yellow water is detected.

_____ Initial

4.9 WHEN the feed and bleed has been completed, THEN **close** the following valves:

4.9.1 1B SFP HX CCW OUTLET LINE VT, Q1P17V015B

_____ Initial

4.9.2 MKUP TO CCW FROM DW STOR TK Q1P17MOV3030A

_____ Initial

4.9.3 Inlet valves attached to the temporary demineralizers.

_____ Initial

4.9.4 Outlet valves attached to the temporary demineralizers.

_____ Initial

4.10 **Open** CCW SRG TK DEMIN INLET ISO, N1P11V045.

_____ Initial

4.11 **Notify** Chemistry personnel CCW feed and bleed evolution is secured.

_____ Initial

4.12 **Remove** the temporary hose connection and cap 1B SFP HX CCW OUTLET LINE VT, Q1P17V015B.

_____ Initial

APPENDIX 2

A TRAIN CCW SURGE TANK FEED AND BLEED
(Page 5 of 6)

4.13 WHEN chemical mixing is no longer required, THEN **close** 1C CCW PUMP CHEM MIXING ISO, Q1P17V278C. _____ Initial

4.14 **INDEPENDENTLY VERIFY** the following valves are CLOSED: _____ Initial

4.14.1 1B SFP HX CCW OUTLET LINE VT, Q1P17V015B _____ Initial

4.14.2 MKUP TO CCW FROM DW STOR TK Q1P17MOV3030A _____ Initial

4.14.3 1C CCW PUMP CHEM MIXING ISO, Q1P17V278C _____ Initial

4.15 **INDEPENDENTLY VERIFY** that CCW SRG TK DEMIN INLET ISO, N1P11V045 is OPEN. _____ Initial

4.16 **Attach** label(s) to any container(s) containing the processed effluent. _____

4.16.1 The labels should **include** the following:

- Date / Time stamp from this appendix. _____
- Source of CCW processed. _____
- Date Chemistry sample requested. _____

4.17 Request Chemistry **perform** sample analysis of the demin effluent stored in the temporary container(s). _____

4.18 WHEN Chemistry sample analysis has been obtained, THEN **perform** the following as applicable.

4.18.1 IF the sample results are satisfactory for disposal, THEN **pump** the contents of the containers labeled per step 4.17 into the nearest sump for processing. _____

4.18.2 IF the sample results indicated further processing, THEN **perform** the following:

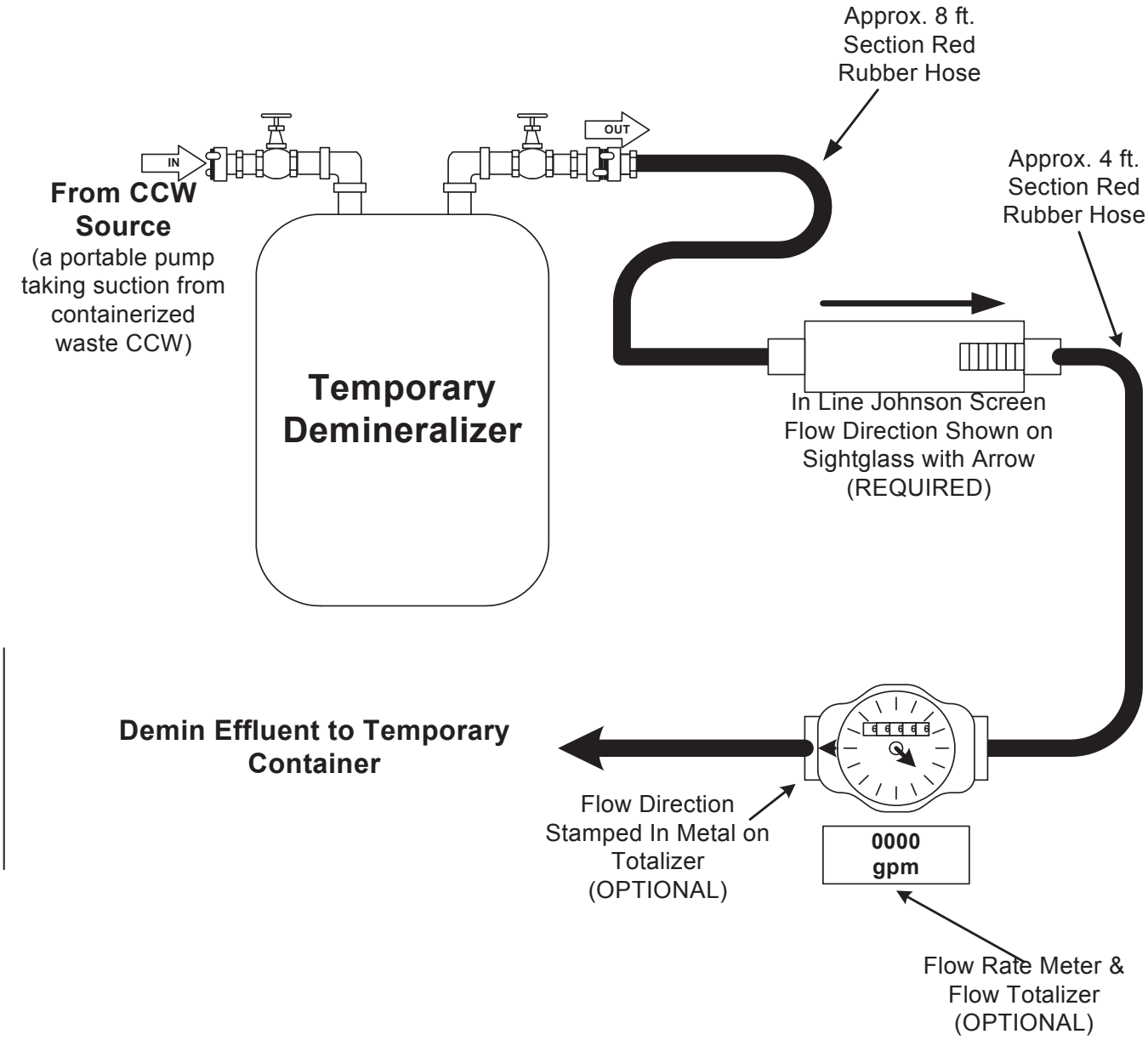
4.18.2.1 **Contact** Operations Supervision for guidance as to how to process the contents of the containers. _____

4.18.2.2 **Remove** all labels attached per step 4.17. _____

4.18.2.3 **Label** the containers to be processed as necessary to prevent inadvertent disposal. _____

APPENDIX 2

A TRAIN CCW SURGE TANK FEED AND BLEED
(Page 6 of 6)
FIGURE 1



NOTE:
The in line Johnson Screen serves as an additional barrier to prevent putting resin into the floor drain system. The temporary demineralizer should not be placed in service without it. The flow indicator and totalizer are optional depending on the need to monitor flowrate and total gallons processed.

APPENDIX 3

CCW PROCESSING USING TEMPORARY DEMIN LINER

APPENDIX 3

CCW PROCESSING
USING TEMPORARY DEMIN LINER
(Deleted by Version 93.0

APPENDIX 4

FEED AND BLEED OF THE ON SERVICE CCW TRAIN
(Deleted by Version 93.0)

APPENDIX 5

PROCESSING CONTAINERS OF WASTE CCW USING
TEMPORARY DEMIN LINER

APPENDIX 5

PROCESSING CONTAINERS OF WASTE CCW
USING TEMPORARY DEMIN LINER

Performed by: _____ Date _____

Reviewed by: _____ Date _____

This appendix consists of 5 pages

APPENDIX 5

PROCESSING CONTAINERS OF WASTE CCW USING
TEMPORARY DEMIN LINER
(Page 1 of 5)

1.0 PURPOSE

1.1 The purpose of this Appendix is to allow processing of containerized waste CCW using a temporary demin liner discharging to suitable container. It is intended that all CCW waste generated on the non-rad side be processed on the non-rad side and all CCW waste generated on the rad side be processed on the rad side.

1.2 The intent is to always process waste CCW recovered from the non-rad thru the liner in the LER. If CCW is recovered from the rad side, then the intent is to process this water thru the demin located on the rad side. {CR 2007106648}

2.0 PRECAUTIONS AND LIMITATIONS

2.1 To extend the life of resin, temporary demineralizers should be isolated with water maintained in them when not in use.

2.2 The empty drums must to be staged correctly in order to effectively use the non-rad side demin rigs. Consult the Pre-job brief sheets for recommendations concerning drum staging. (AI2009201680)

2.3 The empty drums to receive the demineralizer effluent will be rinsed during the CCW processing.

APPENDIX 5

PROCESSING CONTAINERS OF WASTE CCW USING
TEMPORARY DEMIN LINER

3.0 INITIAL CONDITIONS

3.1 The version of this procedure has been verified to be the current version. (OR 1-98-498)

_____ Initial

3.2 The procedure has been verified to be the correct unit for the task. (OR 1-98-498)

_____ Initial

3.3 CCW containers are staged in a location convenient to the temporary demin liner, and a suitable temporary pump is available.

_____ Initial

3.4 A temporary liner with resin is available to process CCW per Figure 1.

_____ Initial

3.5 Suitable container(s) available to receive the demin effluent.

_____ Initial

3.6 Verify that the liner is in place in an area that does not interfere with other work activities, have liner moved as necessary.

_____ Initial

3.7 Notify HP of intent to process waste water via TEMPORARY DEMIN LINER. (CR 2009111090, 2009106771)

_____ Initial

APPENDIX 5

PROCESSING CONTAINERS OF WASTE CCW USING
TEMPORARY DEMIN LINER
(Page 2 of 5)

4.0 INSTRUCTIONS

4.1 **Connect** AND **route** hose from temporary demin effluent to an empty, clean container.

_____ Initial

4.2 **Commence** processing the first pass of resin effluent by performing the following:

4.2.1 **Open** the outlet valve.

_____ Initial

4.2.2 **Throttle** open the inlet valve.

_____ Initial

4.2.3 **Start** the temporary pump.

_____ Initial

4.3 **Sample** the first pass of resin effluent.

_____ CHM

4.4 **Secure** the effluent flow by performing the following:

4.4.1 **Secure** the temporary

_____ Initial

4.4.2 **Close** the inlet valve.

_____ Initial

4.4.3 **Close** the outlet valve.

_____ Initial

4.5 **Determine** discharge path for processed effluent as follows:

4.5.1 **Check** sample for visible chromates. IF visible chromates are present, THEN **recommend** replacement of the portable demineralizer resin, and repeat of steps 4.1 through 4.5.

_____ CHM

- Visible chromates present (circle one) YES / NO

4.6 **Route** outlet hose from temporary demineralizer to the suitable container(s).

_____ Initial

APPENDIX 5

PROCESSING CONTAINERS OF WASTE CCW USING
TEMPORARY DEMIN LINER
(Page 3 of 5)

4.7 **Initiate** continuous processing of containerized CCW by performing the following, as required:

4.7.1 **Open** the inlet valve on the temporary demineralizer. _____ Initial

4.7.2 **Open** the outlet valve on the temporary demineralizer. _____ Initial

4.7.3 **Start** the temporary pump. _____ Initial

4.7.4 For each empty CCW drum to receive CCW, **perform** the following**:**

4.7.4.1. **Process** a small amount of CCW through the demineralizer into the empty drum. _____ Initial

4.7.4.2. **Stop** the temporary pump. _____ Initial

4.7.4.3. **Move** the effluent around inside the drum long enough to sufficiently rinse the inside of the drum. _____ Initial

4.7.4.4. **Pump** the effluent from the rinsed drum back to the original drum containing the CCW to be processed. _____ Initial

4.7.4.5 **Start** the pump to process the CCW drum through the demineralizer and into the drum rinsed in step 4.7.4.3. _____ Initial

NOTE

To monitor demin. effluent, place a white sheet of paper behind the effluent path for comparison to verify water is clear with no yellow tint. ☐

4.8 **Monitor** effluent frequently for CCW and **secure** if detected. _____ Initial

4.9 WHEN processing is complete, THEN **stop** the temporary pump.

4.9.1 **Close** the inlet valve on the temporary demineralizer. _____ Initial

4.9.2 **Close** the outlet valve on the temporary demineralizer. _____ Initial

4.10 **Store** the hoses and the temporary pump in the appropriate location. _____ Initial

APPENDIX 5

PROCESSING CONTAINERS OF WASTE CCW USING
TEMPORARY DEMIN LINER
Page 4 of 5

4.11 **Attach** label(s) to any container(s) containing the processed effluent. _____ Initial

4.11.1 The labels should **include** the following:

- Date / Time stamp from this appendix. _____
- Source of CCW processed. _____
- Date Chemistry sample requested. _____

4.12 Request Chemistry **perform** sample analysis of the demin effluent stored in the temporary container(s). _____ Initial

4.13 WHEN Chemistry sample analysis has been obtained, THEN **perform** the following as applicable.

4.13.1 IF the sample results are satisfactory for disposal, THEN **pump** the contents of the containers labeled per step 4.11 into the nearest sump for processing. _____ Initial

4.13.2 IF the sample results indicated further processing, THEN **perform** the following:

4.13.2.1 **Contact** Operations Supervision for guidance as to how to process the contents of the containers. _____ Initial

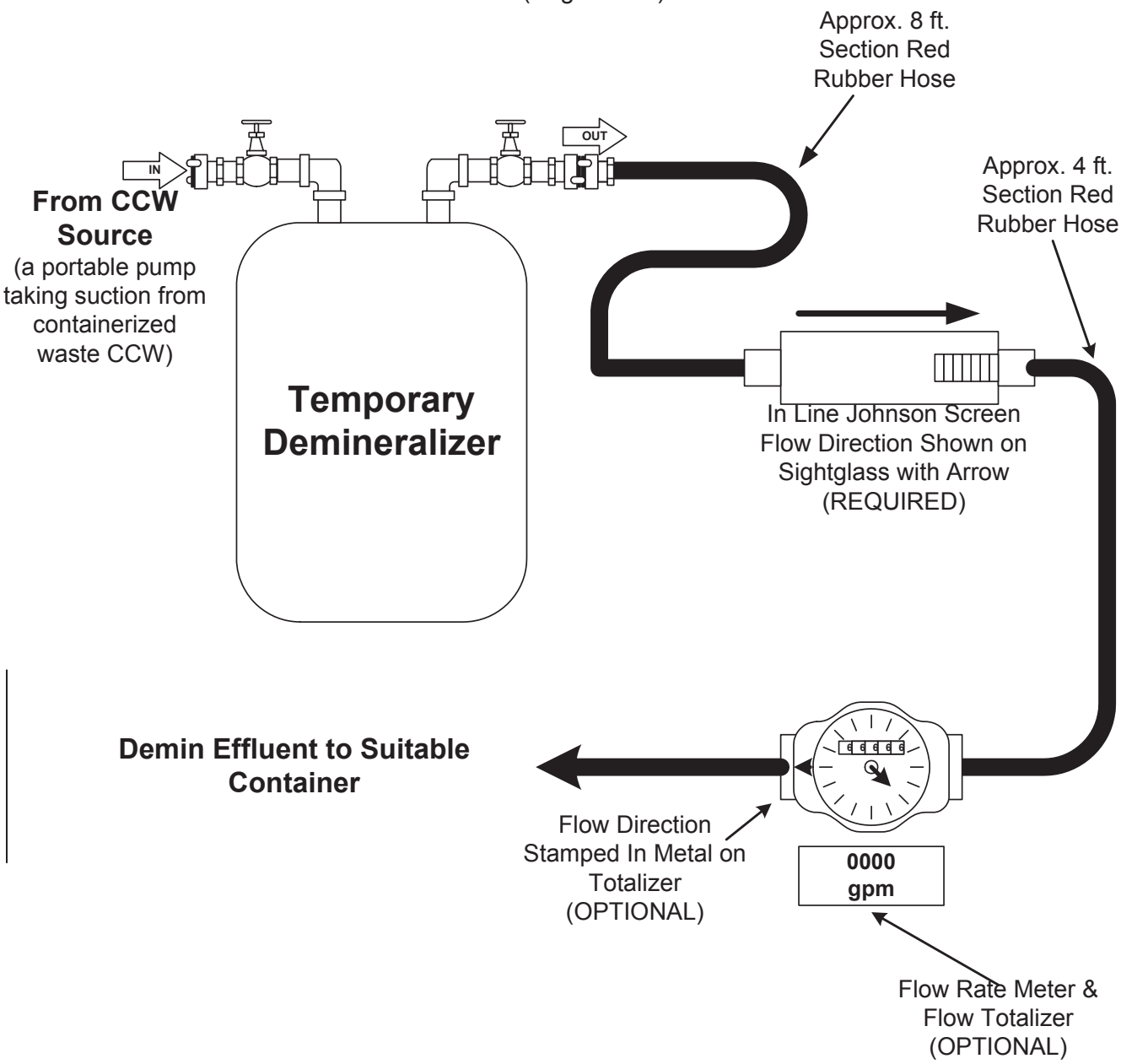
4.13.2.2 **Remove** all labels attached per step 4.11. _____ Initial

4.13.2.3 **Label** the containers to be processed as necessary to prevent inadvertent disposal. _____ Initial

APPENDIX 5

PROCESSING CONTAINERS OF WASTE CCW USING
TEMPORARY DEMIN LINER
FIGURE 1

(Page 5 of 5)



NOTE:
The in line Johnson Screen serves as an additional barrier to prevent putting resin into the floor drain system. The temporary demineralizer should not be placed in service without it. The flow indicator and totalizer are optional depending on the need to monitor flowrate and total gallons processed.

APPENDIX 6

CCW SYSTEM REFILL FROM DRUMS

Performed by: _____ Date _____

Verified by: _____ Date _____

Reviewed by: _____ Date _____

This appendix consists of 2 pages

APPENDIX 6

CCW SYSTEM REFILL FROM DRUMS
(Page 1 of 2)

1.0 PURPOSE

This appendix provides guidance to pump CCW back into system from drums.

2.0 PRECAUTIONS AND LIMITATIONS

2.1 Continuously monitor CCW Surge Tank level. Maintain below 50". If above 50" then secure adding to surge tank.

2.2 All components used for this connection are required to be pressure tested to 150 psig which provides assurance that the system can withstand CCW system pressure. All hoses are to have banded fittings.

2.3 Verify adequate capacity exists in the CCW surge tank before transferring any CCW into the CCW Surge Tank.

2.4 Ensure that CCW to be added has been sampled by chemistry and meets CCW chemistry specs.

3.0 INITIAL CONDITIONS

3.1 The version of this procedure has been verified to be the current version. (OR 1-98-498)

_____
Initial

3.2 The procedure has been verified to be the correct unit for the task. (OR 1-98-498)

_____
Initial

3.3 Perform the following at CCW SRG TK CHEM ADD, Q1P17V114:

3.3.1 Remove pipe cap.

_____
Initial

3.3.2 Connect a hose pressure tested to 150 psi from Discharge of portable pump to CCW SRG TK CHEM ADD, Q1P17V114.

_____
Initial

3.4 Establish communication between control room and portable pump operator to control CCW Surge Tank level during pumping.

_____
Initial

APPENDIX 6

CCW SYSTEM REFILL FROM DRUMS
(Page 2 of 2)

4.0 INSTRUCTIONS

4.1 **Notify** Chemistry personnel CCW Surge tank will be filled. _____ Initial

4.2 **Verify** the following chemical mixing valves are CLOSED:

- 1A CCW PUMP CHEM MIXING ISO, Q1P17V278A. _____ Initial
- 1B CCW PUMP CHEM MIXING ISO, Q1P17V278B. _____ Initial
- 1C CCW PUMP CHEM MIXING ISO, Q1P17V278C. _____ Initial

4.3 **Ensure** portable pump and hoses set up to take suction and pump to CCW surge tank. _____ Initial

4.4 **Open** CCW SRG TK CHEM ADD, Q1P17V114 and check for leaks. _____ Initial

4.5 **Have** Control Room monitor CCW Surge Tank Level. _____ Initial

4.6 **Start** the portable pump and **transfer** CCW to Surge Tank. _____ Initial

4.7 WHEN transfer complete or when directed by the control room, THEN **stop** portable pump. _____ Initial

4.8 **Perform** the following at CCW SRG TK CHEM ADD, Q1P17V114:

4.8.1 **Close** CCW SRG TK CHEM ADD, Q1P17V114. _____ Initial

4.8.2 **Remove** hose. _____ Initial

4.8.3 **Reinstall** cap. _____ Initial

4.9 **Store** portable pump and hoses. _____ Initial

4.10 **Return** CCW drums to storage _____ Initial

APPENDIX 7

PROCESSING WASTE CCW
USING TEMPORARY DEMIN LINER DIRECTLY FROM SYSTEM

Performed by: _____ Date _____

Reviewed by: _____ Date _____

This appendix consists of 6 pages

APPENDIX 7
PROCESSING WASTE CCW USING
TEMPORARY DEMIN LINER DIRECTLY FROM SYSTEM

(Page 1 of 6)

1.0 PURPOSE

The purpose of this procedure Appendix is to allow processing waste CCW using a temporary demin liner discharging to temporary container.

2.0 PRECAUTIONS AND LIMITATIONS

2.1 To extend the life of resin, temporary demineralizers should be isolated with water maintained in them when not in use.

2.2 When opening low point drain and high point vent do so slowly and carefully to prevent spilling if system has any pressure remaining.

2.3 Many CCW vent valves are Kerotest stop-check valves which close when draining a system, preventing the system from venting properly. This could make the section being drained appear to be empty when waste CCW is still in the system.

2.4 All components used for this connection are required to be pressure tested to 150 psig, which provides assurance that the system can withstand CCW system pressure. All hoses are to have banded fittings.

2.5 Chemistry should sample the non-rad sumps for chromates, oil, and activity prior to pumping to the Turbine Building sump(s).

2.6 To preclude the risk of NPDES non-compliance, the discharge from the temporary demineralizer will be contained in drums or other suitable container until completion of Chemistry sample results. Once Chemistry has confirmed that the demin effluent is acceptable for release to the environment, discharge to the environment may take place.

3.0 INITIAL CONDITIONS

3.1 The version of this procedure has been verified to be the current version. (OR 1-98-498)

_____ Initial

3.2 The procedure has been verified to be the correct unit for the task. (OR 1-98-498)

_____ Initial

3.3 A suitable temporary pump is available.

_____ Initial

3.4 A temporary liner with resin is available to process CCW per Figure 1.

_____ Initial

APPENDIX 7
PROCESSING WASTE CCW USING
TEMPORARY DEMIN LINER DIRECTLY FROM SYSTEM

(Page 2 of 6)

3.5 Suitable container(s) available to receive demin effluent.

_____ Initial

3.6 Verify that the liner is in place in an area that does not interfere with other work activities. Have liner moved as necessary.

_____ Initial

3.7 Using plant drawings determine location of low point drain and high point vent to be used during waste CCW processing.

_____ Initial

- High point vent: _____
- Low point drain: _____

3.8 The section of the CCW system that maintenance is to be performed on is isolated and tagged.

_____ Initial

3.9 If the liner is placed external to the Auxiliary Building, then a barrier is in place around the temporary lines to contain a CCW spill if one should occur. Contact FAC group, if necessary, to provide a barrier if needed.

_____ Initial

3.10 If necessary, then direct maintenance to remove one section of grating from the Lower Equipment Room hatch to allow process hoses to be routed (Small section on south east corner).

_____ Initial

APPENDIX 7
PROCESSING WASTE CCW USING
TEMPORARY DEMIN LINER DIRECTLY FROM SYSTEM

(Page 3 of 6)

4.0 INSTRUCTIONS

4.1 **Ensure** that system section to be drained is isolated AND depressurized. _____ Initial

4.2 **Attach** a hose from the return system on the temporary demin AND **route** the hose to the LER sump (See Figure 1). _____ Initial

4.3 **Connect** suction hose to temporary pump from low point drain. _____ Initial

- Sections drain point: _____

4.4 **Open** section drain point AND **check** for leaks. _____ Initial

- Valve opened: _____

4.5 **Verify** high point vent OPEN. _____ Initial

- High point vent: _____

CAUTION
An excessive flow rate will allow high chromium level in the demin effluent. Do not increase the flow rate without obtaining a sample of demin effluent for chromium. ☐

4.6 **Commence** processing the first pass of resin effluent by performing the following:

4.6.1 **Open** the outlet valve. _____ Initial

4.6.2 **Throttle** open the inlet valve. _____ Initial

4.6.3 **Start** the temporary pump. _____ Initial

4.7 **Verify** CCW is being processed by the temporary demin AND draining back to the LER sump. _____ Initial

APPENDIX 7
PROCESSING WASTE CCW USING
TEMPORARY DEMIN LINER DIRECTLY FROM SYSTEM

(Page 4 of 6)

NOTE

To monitor demin effluent, place a white sheet of paper behind the effluent path for comparison to verify water is clear with no yellow tint. ☐

4.8 **Monitor** demin effluent frequently, and **secure** processing if yellow water is detected.

_____ Initial

4.9 WHEN the temporary container level is high THEN **stop** draining by securing temporary pump AND closing inlet valve to demin.

_____ Initial

4.10 **Close** section drain point opened in Step 4.4.

_____ Initial

- Valve closed: _____

4.11 **Remove** temporary pump suction hose from CCW section drained.

_____ Initial

4.12 **Close** high point vent valve opened in Step 4.5.

_____ Initial

- Valve closed: _____

4.13 IF desired, THEN **have** the temporary demin removed.

_____ Initial

4.14 IF removed, THEN **have** maintenance replace grating removed on the lower equipment room hatch.

_____ MM

4.15 **Store** the hoses and the temporary pump in the appropriate location.

_____ Initial

APPENDIX 7
PROCESSING WASTE CCW USING
TEMPORARY DEMIN LINER DIRECTLY FROM SYSTEM

(Page 5 of 6)

4.16 **Attach** label(s) to any container(s) containing the processed effluent.

_____ Initial

4.16.1 The labels should **include** the following:

- Date / Time stamp from this appendix. _____
- Source of CCW processed. _____
- Date Chemistry sample requested. _____

4.17 Request Chemistry **perform** sample analysis of the demin effluent stored in the temporary container(s).

_____ Initial

4.18 WHEN Chemistry sample analysis has been obtained, THEN **perform** the following as applicable.

4.18.1 IF the sample results are satisfactory for disposal, THEN **pump** the contents of the containers labeled per step 4.16 into the nearest sump for processing.

_____ Initial

4.18.2 IF the sample results indicated further processing, THEN **perform** the following:

4.18.2.1 **Contact** Operations Supervision for guidance as to how to process the contents of the containers.

_____ Initial

4.18.2.2 **Remove** all labels attached per step 4.16.

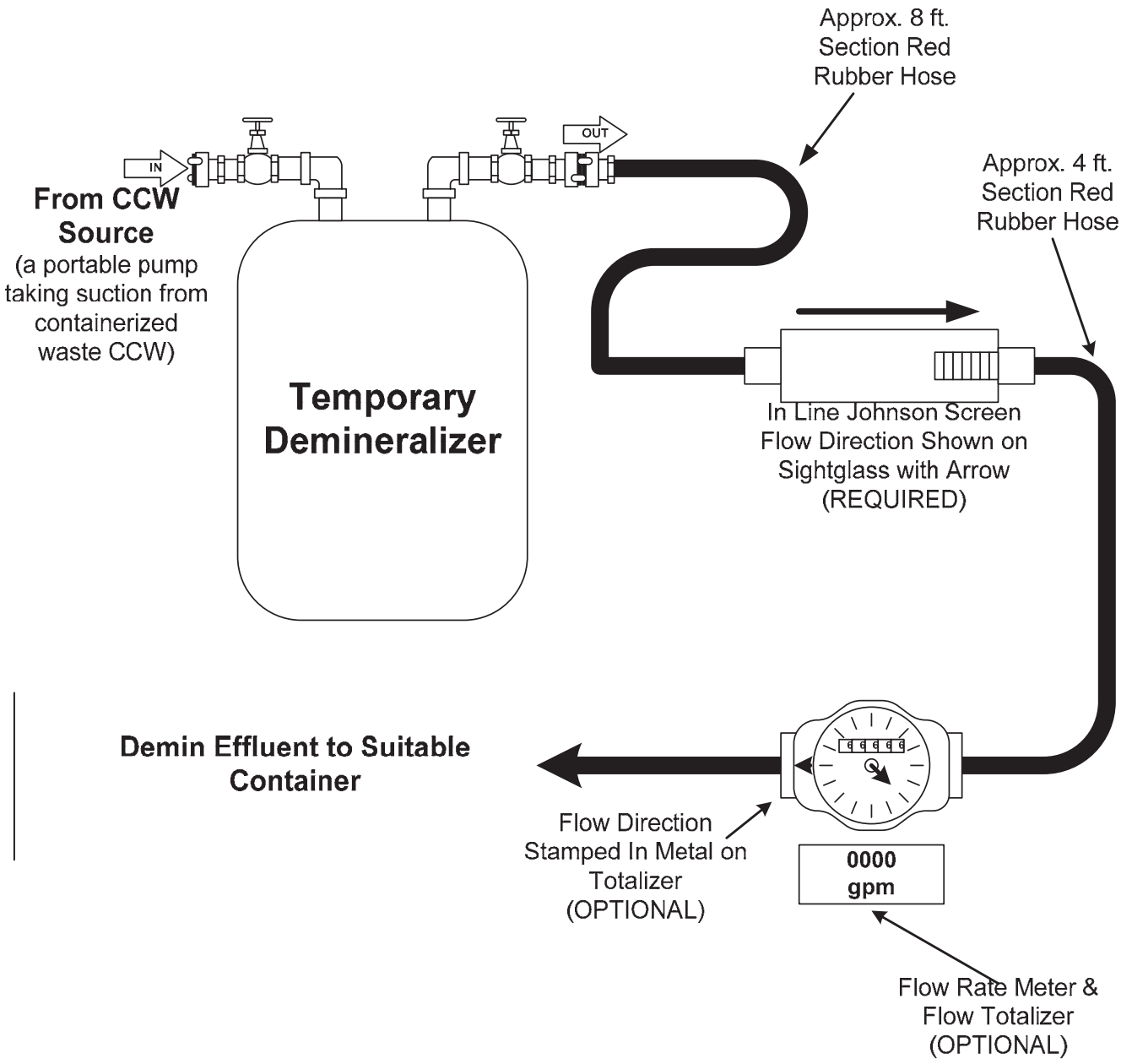
_____ Initial

4.19 **Label** the containers to be processed as necessary to prevent inadvertent disposal.

_____ Initial

APPENDIX 7
PROCESSING WASTE CCW USING
TEMPORARY DEMIN LINER DIRECTLY FROM SYSTEM

(Page 6 of 6)
FIGURE 1



NOTE:
The in line Johnson Screen serves as an additional barrier to prevent putting resin into the floor drain system. The temporary demineralizer should not be placed in service without it. The flow indicator and totalizer are optional depending on the need to monitor flowrate and total gallons processed.

APPENDIX 8

ALIGNING B TRAIN CCW
TO ALLOW OPERATION OF BOTH SFP COOLING TRAINS
DURING CORE OFFLOAD WITH B TRAIN SW OUT OF SERVICE

Performed by: _____ Date _____

Reviewed by: _____ Date _____

This appendix consists of 7 pages

APPENDIX 8

ALIGNING B TRAIN CCW TO ALLOW OPERATION OF BOTH
SFP COOLING TRAINS DURING CORE OFFLOAD WITH B TRAIN SW OUT OF SERVICE
(Page 1 of 7)

1.0 PURPOSE

Provide guidance to ensure B Train SFP Cooling has the necessary CCW cooling during core offload with B Train SW secured.

2.0 PRECAUTIONS AND LIMITATIONS

2.1 To maintain SFP temperature as low as possible during the core off load, consideration should be given to maximizing CCW cooling to the SFP HX(s) early in the fuel transfer to the SFP. Throttle CCW flow to the on service RHR HX(s) as required to maintain appropriate cooling to the on-service train(s) of RHR during core off load. CCW flow rates in excess of 3100 GPM through the SFP HX should be avoided. (1R23 OLL103 CR2010114600)

2.2 B Train room coolers will have no service water flow.

3.0 INITIAL CONDITIONS

3.1 The version of this procedure has been verified to be the current version. (OR 1-98-498)

_____ Initial

3.2 This procedure has been verified to be the correct unit for the task. (OR 1-98-498)

_____ Initial

3.3 The plant is in Mode 5 or 6.

_____ Initial

3.4 B Train CCW is secured.

_____ Initial

3.5 A Train is the On Service Train with 1C CCW Pump aligned to 1C CCW HX.

_____ Initial

3.6 The miscellaneous header has no component operating which requires cooling with the exception of charging pump miniflow lines.

_____ Initial

3.7 A Train Service Water is in operation per FNP-1-SOP-24.0, SERVICE WATER SYSTEM.

_____ Initial

3.8 Service Water is isolated to the turbine building.

_____ Initial

APPENDIX 8

ALIGNING B TRAIN CCW TO ALLOW OPERATION OF BOTH
SFP COOLING TRAINS DURING CORE OFFLOAD WITH B TRAIN SW OUT OF SERVICE
(Page 2 of 7)

3.9 A Train Spent Fuel Pool Cooling is on service.

_____
Initial

3.10 B Train Service Water outage is in progress or planned, and it is desired place B Train SFP Cooling in service per FNP-1-SOP-54.0, SPENT FUEL PIT COOLING AND PURIFICATION SYSTEM, Appendix 1.

_____
Initial

3.11 1B CCW Pump has been verified aligned to A Train power supply per FNP-1-SOP-23.0C, SHIFTING ON SERVICE TRAIN FROM TRAIN B TO TRAIN A, steps 7.1 through 7.12.

_____
Initial

3.12 Admin LCO is written to ensure power supply breaker Q1R17BKRFVD5, SW TO 1B CCW HX Q1P16MOV3130B is opened prior to Mode 4 entry.

_____
Initial

3.13 The DC control power switch for Q1R15BKRDF05 is open.

_____
Initial

APPENDIX 8

ALIGNING B TRAIN CCW TO ALLOW OPERATION OF BOTH
SFP COOLING TRAINS DURING CORE OFFLOAD WITH B TRAIN SW OUT OF SERVICE
(Page 3 of 7)

4.0 INSTRUCTIONS

4.1 **Align** A Train SW supply through 1B and 1C CCW HX simultaneously as follows:

4.1.1 **Verify** closed 1B CCW HX B TRN SW INLET HDR ISO, Q1P16V002B. _____ Initial

4.1.2 **Verify** closed 1B CCW HX B TRN SW INLET HDR ISO, Q1P16V002A. _____ Initial

4.1.3 **Verify** closed 1B CCW HX B TRN SW RTN HDR ISO, Q1P16V008C. _____ Initial

4.1.4 **Verify** closed 1B CCW HX B TRN SW RTN HDR ISO, Q1P16V008B. _____ Initial

4.1.5 **Verify** open 1B CCW HX A TRN SW INLET HDR ISO, Q1P16V002D. _____ Initial

4.1.6 **Verify** open 1B CCW HX A TRN SW INLET HDR ISO, Q1P16V002C. _____ Initial

4.1.7 **Verify** open 1B CCW HX A TRN SW RTN HDR ISO, Q1P16V008E. _____ Initial

4.1.8 **Verify** open 1B CCW HX A TRN SW RTN HDR ISO, Q1P16V008D. _____ Initial

4.1.9 **Open** SW TO 1B CCW HX Q1P16MOV3130B. _____ Initial

APPENDIX 8

ALIGNING B TRAIN CCW TO ALLOW OPERATION OF BOTH
SFP COOLING TRAINS DURING CORE OFFLOAD WITH B TRAIN SW OUT OF SERVICE
(Page 4 of 7)

4.2 **Align** 1B CCW heat exchanger to supply B Train CCW cooling as follows:

4.2.1 IF any charging pump running, THEN **verify** total charging flow ≥ 60 gpm. _____ Initial

4.2.2 **Close** CCW SUPPLY HDR XCONN, Q1P17V009C. _____ Initial

4.2.3 **Close** CCW SUPPLY HDR XCONN, Q1P17V009D. _____ Initial

4.2.4 **Close** CCW PUMPS DISCH HDR XCONN, Q1P17V003C. _____ Initial

4.2.5 **Close** CCW PUMPS DISCH HDR XCONN, Q1P17V003D. _____ Initial

4.2.6 **Close** CCW PUMPS SUCT HDR XCONN, Q1P17V110D. _____ Initial

4.2.7 **Close** CCW PUMPS SUCT HDR XCONN, Q1P17V110E. _____ Initial

4.2.8 **Open** CCW PUMPS SUCT HDR XCONN, Q1P17V110C. _____ Initial

4.2.9 **Open** CCW PUMPS SUCT HDR XCONN, Q1P17V110B. _____ Initial

4.2.10 **Open** CCW PUMPS DISCH HDR XCONN, Q1P17V003A. _____ Initial

4.2.11 **Open** CCW PUMPS DISCH HDR XCONN, Q1P17V003B. _____ Initial

4.2.12 **Open** CCW SUPPLY HDR XCONN, Q1P17V009A. _____ Initial

4.2.13 **Open** CCW SUPPLY HDR XCONN, Q1P17V009B. _____ Initial

4.2.14 **Open** 1B CCW HX CCW OUTLET ISO, Q1P17V008B. _____ Initial

4.2.15 **Close** 1A CCW HX CCW OUTLET ISO, Q1P17V008A. _____ Initial

4.2.16 **Close** DC control power switch for Q1R15BKRDF05. _____ Initial

4.2.16.1 **Check** the breaker closing spring charged. _____ Initial

APPENDIX 8

ALIGNING B TRAIN CCW TO ALLOW OPERATION OF BOTH
SFP COOLING TRAINS DURING CORE OFFLOAD WITH B TRAIN SW OUT OF SERVICE
(Page 5 of 7)

4.3 **Place** 1B CCW heat exchanger on service as follows:

4.3.1 **Verify** SW FROM 1B CCW HX Q1P16FV3009B in MOD. **Throttle** 1B CCW HX DISCH FCV HIC 3009B as necessary to control CCW temperature.

_____ Initial

4.3.2 **Verify** CCW TO 1B RHR HX Q1P17MOV3185B is OPEN.

_____ Initial

4.3.3 **Start** 1B CCW PUMP and **verify** flow increase on FI3043BA for the 1B CCW HX.

_____ Initial

NOTE

The 1B and 1C CCW HXs are supplied from A Train SW. Adjusting 1B or 1C CCW HX DISCH FCV, HIC 3009B or C affects A Train SW header pressure. ☐

4.3.4 **Maintain** CCW FROM CCW HX TEMP TI 3042B less than 105°F.

_____ Initial

NOTE

If the miscellaneous header is in service, it is aligned to the 1B CCW HX which is aligned to B Train CCW. ☐

4.3.5 IF desired, THEN after system is stable, **close** CCW to 1B RHR HX Q1P17MOV3185B.

_____ Initial

4.4 Restoration to normal alignment after the BTrain of SFP cooling has been secured.

4.4.1 **Verify** miscellaneous header has no component operating which requires cooling with the exception of charging pump miniflow lines.

_____ Initial

4.4.2 IF any charging pump running, THEN **verify** total charging flow ≥ 60 gpm.

_____ Initial

APPENDIX 8

ALIGNING B TRAIN CCW TO ALLOW OPERATION OF BOTH
SFP COOLING TRAINS DURING CORE OFFLOAD WITH B TRAIN SW OUT OF SERVICE
(Page 6 of 7)

NOTE

The following step stops all B Train CCW Flow. ☐

4.4.3 **Secure** the 1B CCW Pump.

_____ Initial

4.4.4 IF available, THEN **verify** open CCW to 1B RHR HX Q1P17MOV3185B.

_____ Initial

4.4.5 **Open** the DC control power switch for Q1R15BKRDF05.

_____ Initial

4.4.6 **Close** SW TO 1B CCW HX Q1P16MOV3130B.

_____ Initial

NOTE

The following sequence aligns the miscellaneous header to A Train CCW. ☐

4.4.7 **Close** 1B CCW HX CCW OUTLET ISO, Q1P17V008B.

_____ Initial

4.4.8 **Open** 1A CCW HX CCW OUTLET ISO, Q1P17V008A.

_____ Initial

4.4.9 **Close** CCW SUPPLY HDR XCONN, Q1P17V009A.

_____ Initial

4.4.10 **Close** CCW SUPPLY HDR XCONN, Q1P17V009B.

_____ Initial

APPENDIX 8

ALIGNING B TRAIN CCW TO ALLOW OPERATION OF BOTH
SFP COOLING TRAINS DURING CORE OFFLOAD WITH B TRAIN SW OUT OF SERVICE
(Page 7 of 7)

4.4.11 **Close** CCW PUMPS DISCH HDR XCONN, Q1P17V003B. _____ Initial

4.4.12 **Close** CCW PUMPS DISCH HDR XCONN, Q1P17V003A. _____ Initial

4.4.13 **Close** CCW PUMPS SUCT HDR XCONN, Q1P17V110C. _____ Initial

4.4.14 **Close** CCW PUMPS SUCT HDR XCONN, Q1P17V110B. _____ Initial

4.4.15 **Open** CCW PUMPS SUCT HDR XCONN, Q1P17V110E. _____ Initial

4.4.16 **Open** CCW PUMPS SUCT HDR XCONN, Q1P17V110D. _____ Initial

4.4.17 **Open** CCW PUMPS DISCH HDR XCONN, Q1P17V003C. _____ Initial

4.4.18 **Open** CCW PUMPS DISCH HDR XCONN, Q1P17V003D. _____ Initial

4.4.19 **Open** CCW SUPPLY HDR XCONN, Q1P17V009D. _____ Initial

4.4.20 **Open** CCW SUPPLY HDR XCONN, Q1P17V009C. _____ Initial

4.4.21 **Close** DC control power switch for Q1R15BKRDF05. _____ Initial

4.4.21.1 **Check** the breaker closing spring charged. _____ Initial

4.4.22 IF desired, THEN **verify** CCW alignment with A Train on service by performing a walkthrough of FNP-1-SOP-23.0C, SHIFTING ON SERVICE TRAIN FROM TRAIN B TO TRAIN A, Sections 2.0, 3.0 and 4.0. _____ Initial

APPENDIX 9

ALIGNING B CCW PUMP AND B CCW HX
TO B TRAIN WITH A CCW PUMP
AND A CCW HX NOT AVAILABLE OR NOT IN SERVICE

Performed by: _____ Date _____

Reviewed by: _____ Date _____

This appendix consists of 10 pages

APPENDIX 9

ALIGNING B CCW PUMP AND B CCW HX TO B TRAIN WITH A CCW PUMP
AND A CCW HX NOT AVAILABLE OR NOT IN SERVICE
(Page 1 of 10)

1.0 PURPOSE

This appendix provides guidance for aligning the 1B CCW Pump and the 1B CCW Heat Exchanger to the B Train when the 1A CCW Pump and the 1A CCW Heat Exchanger are out of service or unavailable for service.

2.0 PRECAUTIONS AND LIMITATIONS

2.1 To maintain SFP temperature as low as possible during the core off load, consideration should be given to maximizing CCW cooling to the SFP HX(s) early in the fuel transfer to the SFP. Throttle CCW flow to the on service RHR HX(s) as required to maintain appropriate cooling to the on-service train(s) of RHR during core off load. CCW flow rates in excess of 3100 GPM through the SFP HX should be avoided. (1R23 OLL103 CR2010114600)

2.2 B Train room coolers will have no service water flow.

2.3 Any operations involving manipulation of the 4kV disconnect switches associated shall include visual confirmation of the following:

2.3.1 The main contacts are in the required state, open or closed. (One contact per phase.) Refer to figure 1 and 2.

2.3.2 The arcing contacts are in the required state, open or closed. (One contact per phase.) Refer to figure 1 and 2.

APPENDIX 9

ALIGNING B CCW PUMP AND B CCW HX TO B TRAIN WITH A CCW PUMP
AND A CCW HX NOT AVAILABLE OR NOT IN SERVICE
(Page 2 of 10)

3.0 INITIAL CONDITIONS

3.1 The version of this appendix has been verified to be the current version. (OR 1-98-498)

_____ Initial

3.2 The appendix has been verified to be the correct unit for the task. (OR 1-98-498)

_____ Initial

3.3 1B CCW Pump and 1B CCW Heat Exchanger are currently aligned to A CCW train.

_____ Initial

3.4 A Train CCW is aligned for service per FNP-1-SOP-23.0A with acceptable line up deviation documented.

_____ Initial

3.5 The Miscellaneous header is not required to be in service during the performance of this appendix.

_____ Initial

3.6 The reactor is defueled.

_____ Initial

APPENDIX 9

ALIGNING B CCW PUMP AND B CCW HX TO B TRAIN WITH A CCW PUMP AND A CCW HX NOT AVAILABLE OR NOT IN SERVICE
(Page 3 of 10)

4.0 INSTRUCTIONS

4.1 IF required, THEN **place** the 1C CCW Pump in service on A Train as follows:

NOTE

Step 4.1.1 is performed to minimize the pressure transient which could otherwise result in CCW to Thermal Barrier HX isolation. ☐

CAUTION

The operation of two pumps through one HX is not allowed. ☐

4.1.1 IF not aligned, THEN **open** CCW TO 1A RHR HX Q1P17MOV3185A.

_____ Initial

4.1.2 Simultaneously **start** the Standby 1C CCW Pump AND **stop** the on service 1B CCW Pump.

_____ Initial

4.1.3 IF not required for RHR operations, WHEN the system has stabilized, THEN **close** CCW TO 1A RHR HX, Q1P17MOV3185A.

_____ Initial

4.2 **Verify** the 1A CCW Pump and 1A CCW Heat Exchanger isolated:

4.2.1 **Verify** that 1A CCW Pump and heat exchanger is out of service and isolated by an appropriate tagging order,

_____ Initial

OR

4.2.2 **Perform** the following isolation steps.

4.2.2.1 **Verify** Q1R15BKRDG04, COMPONENT COOLING WATER PUMP 1A 52-DG04 is racked out.

_____ Initial

4.2.3 **Verify** that 1A CCW HX CCW OUTLET ISO, Q1P17V008A is closed.

_____ Initial

APPENDIX 9

ALIGNING B CCW PUMP AND B CCW HX TO B TRAIN WITH A CCW PUMP AND A CCW HX NOT AVAILABLE OR NOT IN SERVICE
(Page 4 of 10)

4.3 **Align** 1B CCW Pump and 1B CCW Heat Exchanger to B Train as follows:

4.3.1 **Close** CCW SUPPLY HDR XCONN, Q1P17V009C. _____ Initial

4.3.2 **Close** CCW SUPPLY HDR XCONN, Q1P17V009D. _____ Initial

4.3.3 **Close** CCW PUMPS DISCH HDR XCONN, Q1P17V003C. _____ Initial

4.3.4 **Close** CCW PUMPS DISCH HDR XCONN, Q1P17V003D. _____ Initial

4.3.5 **Open** CCW PUMPS SUCT HDR XCONN, Q1P17V110C**.** _____ Initial

4.3.6 **Open** CCW PUMPS SUCT HDR XCONN, Q1P17V110B. _____ Initial

4.3.7 **Close** CCW PUMPS SUCT HDR XCONN, Q1P17V110D. _____ Initial

4.3.8 **Close** CCW PUMPS SUCT HDR XCONN, Q1P17V110E. _____ Initial

4.3.9 **Open** CCW PUMPS DISCH HDR XCONN, Q1P17V003A. _____ Initial

4.3.10 **Open** CCW PUMPS DISCH HDR XCONN, Q1P17V003B. _____ Initial

4.3.11 **Open** CCW SUPPLY HDR XCONN, Q1P17V009A. _____ Initial

4.3.12 **Open** CCW SUPPLY HDR XCONN, Q1P17V009B. _____ Initial

4.3.13 **Open** 1B CCW HX CCW OUTLET ISO, Q1P17V008B. _____ Initial

APPENDIX 9

ALIGNING B CCW PUMP AND B CCW HX TO B TRAIN WITH A CCW PUMP AND A CCW HX NOT AVAILABLE OR NOT IN SERVICE
(Page 5 of 10)

4.4 **Align** SW to the 1B CCW Heat Exchanger as follows:

4.4.1 **Close** 1B CCW HX A TRN SW INLET HDR ISO, Q1P16V002D. _____ Initial

4.4.2 **Close** 1B CCW HX A TRN SW INLET HDR ISO, Q1P16V002C. _____ Initial

4.4.3 **Close** 1B CCW HX A TRN SW RTN HDR ISO, Q1P16V008E. _____ Initial

4.4.4 **Close** 1B CCW HX A TRN SW RTN HDR ISO, Q1P16V008D. _____ Initial

4.4.5 **Open** 1B CCW HX B TRN SW INLET HDR ISO, Q1P16V002B. _____ Initial

4.4.6 **Open** 1B CCW HX B TRN SW INLET HDR ISO, Q1P16V002A. _____ Initial

4.4.7 **Open** 1B CCW HX B TRN SW RTN HDR ISO, Q1P16V008C. _____ Initial

4.4.8 **Open** 1B CCW HX B TRN SW RTN HDR ISO, Q1P16V008B. _____ Initial

4.4.9 **Verify** SW FROM 1B CCW HX Q1P16FV3009B handswitch is in MOD. _____ Initial

4.4.10 **Verify** 1B CCW HX DISCH FCV HIC 3009B is demanding the valve to be fully closed (100% demand). _____ Initial

4.4.11 Locally **verify** SW FROM 1B CCW HX Q1P16FV3009B is CLOSED. _____ Initial

4.4.12 **Open** SW TO 1B CCW HX Q1P16MOV3130B. _____ Initial

APPENDIX 9

ALIGNING B CCW PUMP AND B CCW HX TO B TRAIN WITH A CCW PUMP AND A CCW HX NOT AVAILABLE OR NOT IN SERVICE
(Page 6 of 10)

4.4.13 **Throttle open** 1B CCW HX DISCH FCV HIC 3009B WHILE **throttling closed** 1A CCW HX DISCH FCV HIC 3009A maintaining existing service water pressure.

_____ Initial

4.4.14 **Verify** 1A CCW HX DISCH FCV HIC 3009A fully CLOSED.

_____ Initial

4.4.15 **Close** SW TO 1A CCW HX Q1P16MOV3130A

_____ Initial

4.5 **Align** B CCW Pump to B Train electrically as follows.

4.5.1 **Rackout** breaker Q1R15BKRDF05. Turn key # RE-14265 in the mechanical interlock on circuit breaker Q1R15BKRDF05 AND **remove** it.

_____ Initial

4.5.2 **Insert** key # RE-14265 into the mechanical interlock on 1B CCW Pump 4KV disconnect switch 1A (Q1R18A004A-A) AND **turn** it. Key # RE-14265 is now held in place.

_____ Initial

4.5.3 **Perform** the following for 1B CCW Pump 4KV disconnect switch 1A (Q1R18A004A-A).

4.5.4 **Open** disconnect switch Q1R18A004A-A.

_____ Initial

4.5.5 **Check** the position indicator reads SW OPEN.

_____ Initial

4.5.6 With the aid of a flashlight, **perform** the following:

4.5.6.1 **Check** that a visible air gap exists between the main contacts on all three phases.

_____ Initial

4.5.6.2 **Check** that a visible air gap exists between the arcing contacts on all three phases.

_____ Initial

APPENDIX 9

ALIGNING B CCW PUMP AND B CCW HX TO B TRAIN WITH A CCW PUMP AND A CCW HX NOT AVAILABLE OR NOT IN SERVICE
(Page 7 of 10)

4.5.7 **Turn** key # RE-14224 in its mechanical interlock on disconnect switch 1A AND **remove** it. 1A disconnect switch is now locked in the open position.

_____ Initial

4.5.8 **Insert** key # RE-14224 into its mechanical interlock on 1B CCW Pump 4KV disconnect switch 1B (Q1R18A004B-B) AND **turn** it. Key # RE-14224 is now held in place.

_____ Initial

4.5.9 **Perform** the following for 1B CCW Pump 4KV disconnect switch 1B (Q1R18A004B-B).

4.5.10 **Close** disconnect switch, Q1R18A004B-B.

_____ Initial

4.5.11 **Check** the position indicator reads SW CLOSED.

_____ Initial

4.5.12 With the aid of a flashlight, **perform** the following:

4.5.12.1 **Check** that NO air gap exists for the main contacts on all three phases. (Contacts closed.)

_____ Initial

4.5.12.2 **Check** that NO air gap exists for the arcing contacts on all three phases. (Contacts closed.)

_____ Initial

4.5.13 **Turn** key # RE-14291 in its mechanical interlock.

_____ Initial

4.5.14 **Remove** key # RE-14291. 1B disconnect switch is now locked in the closed position.

_____ Initial

CAUTION
Breaker Q1R15BKRDG05 has alternate DC control power supplied through fuses in C-HSDP when 1B CCW PUMP LOCAL-REMOTE switch on C-HSDP is in LOCAL. ☐

4.5.15 **Verify** LOCAL-REMOTE switch on C-HSDP for 1B CCW PUMP in REMOTE

_____ Initial

APPENDIX 9

ALIGNING B CCW PUMP AND B CCW HX TO B TRAIN WITH A CCW PUMP AND A CCW HX NOT AVAILABLE OR NOT IN SERVICE
(Page 8 of 10)

4.5.16 **Insert** key # RE-14291 into its mechanical interlock on circuit breaker Q1R15BKRDG05.

_____ Initial

4.5.17 **Turn** key # RE-14291. Key # RE-14291 is now held in place.

_____ Initial

4.5.18 **Rack** circuit breaker Q1R15BKRDG05 to the CONNECTED position.

_____ Initial

4.5.19 **Close** DC control power switch for Q1R15BKRDG05 AND **verify** breaker spring charges.

_____ Initial

NOTES

1B CCW Hx and Pump are now aligned to B Train and can be placed in service if required.

At a minimum, the 1B CCW Pump should be “bumped” to cycle the breaker for verifying operability following the racking process. ☐

4.6 **Open** CCW TO 1B RHR HX Q1P17MOV3185B.

_____ Initial

4.7 **Start** the 1B CCW Pump.

_____ Initial

4.8 IF not required for RHR operations, WHEN the system has stabilized, THEN **close** CCW TO 1B RHR HX, Q1P17MOV3185B.

_____ Initial

4.9 **Throttle** 1B CCW HX DISCH FCV HIC 3009B as required to control CCW temperature.

_____ Initial

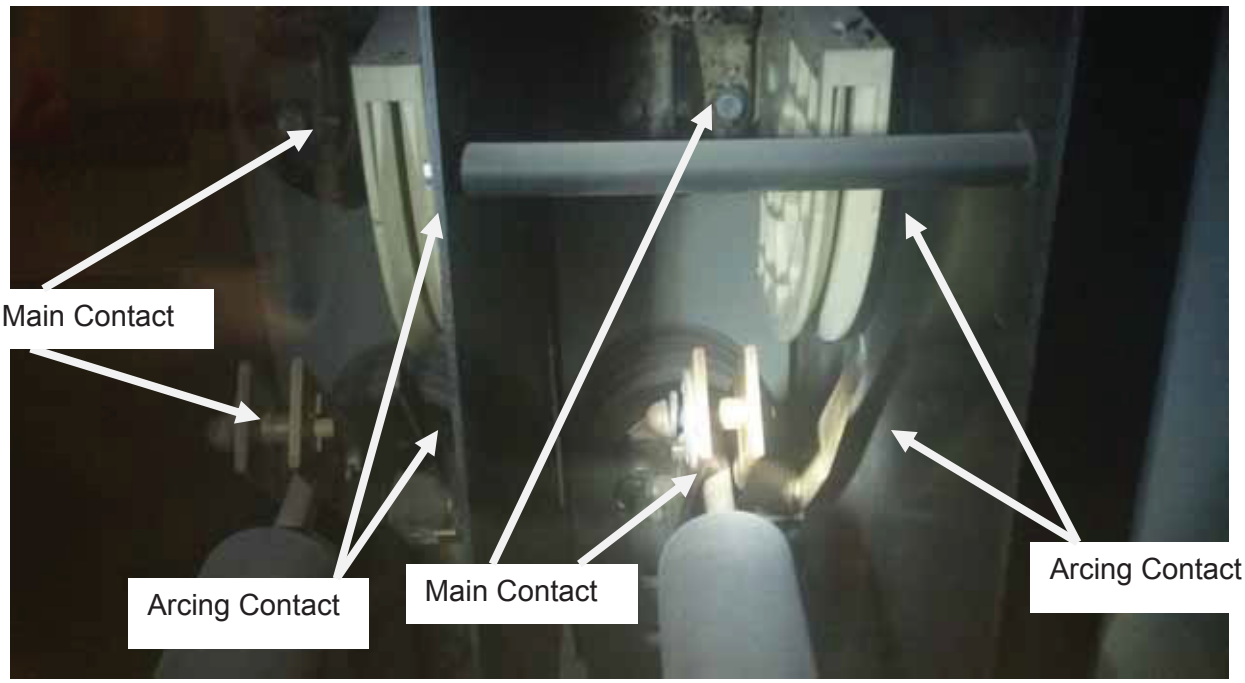
APPENDIX 9

ALIGNING B CCW PUMP AND B CCW HX TO B TRAIN WITH A CCW PUMP AND A CCW HX NOT AVAILABLE OR NOT IN SERVICE

FIGURE 1

Typical 4kV Disconnect shown in OPEN condition.

Correct Contact Configuration



Two Phases shown.

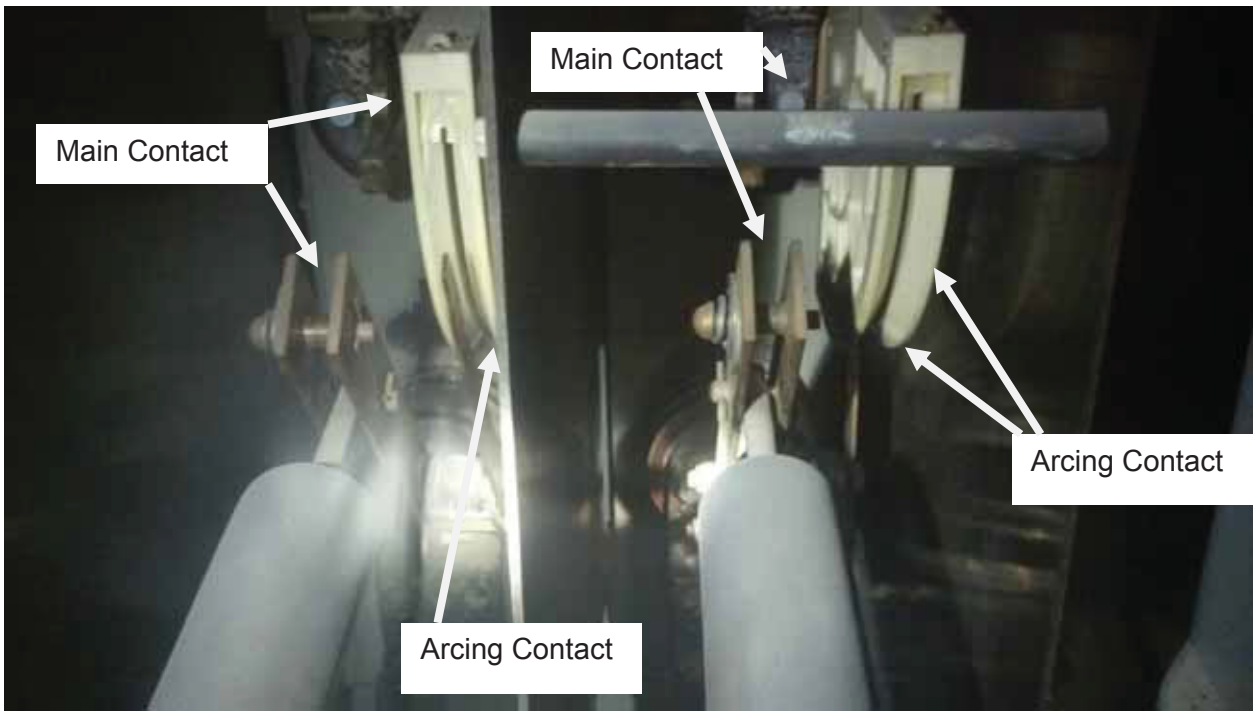
APPENDIX 9

ALIGNING B CCW PUMP AND B CCW HX TO B TRAIN WITH A CCW PUMP AND A CCW HX NOT AVAILABLE OR NOT IN SERVICE

FIGURE 2

Typical 4kV Disconnect shown in OPEN condition.

Incorrect Contact Configuration



Two Phases shown.

Main contacts open but arcing contact on right is closed (no air gap)

APPENDIX 10

RETURNING 1A CCW PUMP TO SERVICE AFTER MAINTENANCE

Performed by: _____ Date _____

Reviewed by: _____ Date _____

This appendix consists of 4 pages

APPENDIX 10

RETURNING 1A CCW PUMP TO SERVICE AFTER MAINTENANCE
(Page 1 of 4)

1.0 PURPOSE

This appendix provides guidance for filling, venting, and aligning the 1A CCW pump for service after maintenance.

2.0 INITIAL CONDITIONS

2.1 The version of this procedure has been verified to be the current version. (OR 1-98-498)

_____ Initial

2.2 This procedure has been verified to be the correct unit for the task. (OR 1-98-498)

_____ Initial

2.3 1A CCW Pump breaker Q1R15BKRDG04 is racked out.

_____ Initial

3.0 INSTRUCTIONS

3.1 **Verify** pump and motor oil levels are 25% to 75%.

_____ Initial

3.2 **Verify** the following vent and drain valves are CLOSED AND CAPPED.

- 1A CCW PUMP DRN, Q1P17V157A

_____ Initial

- 1A CCW PUMP DRN, Q1P17V157B

_____ Initial

- 1A CCW PUMP VENT, Q1P17V156D

_____ Initial

- 1A CCW PUMP DISCH HDR DRN, Q1P17V281A

_____ Initial

3.3 **Verify** the following vent valves are CLOSED, but NOT capped. These valves will be used for venting.

- 1A CCW PUMP SUCT LINE VT, Q1P17V279A

_____ Initial

- 1A CCW PUMP VT, Q1P17V156A

_____ Initial

3.4 **Check** 1A CCW PUMP SUCT Q1P17V109A CLOSED.

_____ Initial

APPENDIX 10

RETURNING 1A CCW PUMP TO SERVICE AFTER MAINTENANCE
(Page 2 of 4)

3.5 **Check** 1A CCW PUMP DISCH ISO Q1P17V002A CLOSED. _____ Initial

3.6 **Check** 1A CCW PUMP MINI-FLOW Q1P17V144A CLOSED. _____ Initial

3.7 **Perform** the following at 1A CCW PUMP VT Q1P17V156A: _____ Initial

3.7.1 **Attach** hose to 1A CCW PUMP VT Q1P17V156A. _____ Initial

3.7.2 **Route** hose to suitable container. _____ Initial

3.7.3 **Open** 1A CCW PUMP VT Q1P17V156A. _____ Initial

3.8 **Perform** the following at 1A CCW PUMP SUCT LINE VT, Q1P17V279A:

3.8.1 **Attach** hose to 1A CCW PUMP SUCT LINE VT, Q1P17V279A. _____ Initial

3.8.2 **Route** hose to suitable container. _____ Initial

3.8.3 **Open** 1A CCW PUMP SUCT LINE VT, Q1P17V279A. _____ Initial

NOTE

The mini-flow valve should be opened slowly to fill the pump. Opening of the valve too quickly can result in excessive pressure being placed on the mechanical seal.
AI 2009201838 ☐

3.9 **Perform** the following to fill 1A CCW PUMP:

3.9.1 **Notify** Control Room of filling of 1A CCW PUMP: _____ Initial

3.9.2 Slowly **throttle open** 1A CCW PUMP MINI-FLOW Q1P17V144A. _____ Initial

3.9.3 **Observe** 1A CCW PUMP VT Q1P17V156A, AND 1A CCW PUMP SUCT LINE VT, Q1P17V279A. _____ Initial

APPENDIX 10

RETURNING 1A CCW PUMP TO SERVICE AFTER MAINTENANCE
(Page 3 of 4)

3.9.4 WHEN air free water is observed at the valves, THEN **close** the following valves:

- 1A CCW PUMP VT Q1P17V156A _____ Initial
- 1A CCW PUMP SUCT LINE VT, Q1P17V279A _____ Initial

3.10 **Remove** hose AND **cap** 1A CCW PUMP SUCT LINE VT, Q1P17V279A. _____ Initial

3.11 **Remove** hose AND **cap** 1A CCW PUMP VT Q1P17V156A _____ Initial

3.12 **Open** 1A CCW PUMP MINI-FLOW Q1P17V144A _____ Initial

3.13 **Open** 1A CCW PUMP SUCT Q1P17V109A. _____ Initial

3.14 **Open** 1A CCW PUMP DISCH ISO Q1P17V002A. _____ Initial

3.15 **INDEPENDENTLY VERIFY** the following are CLOSED AND CAPPED:

- 1A CCW PUMP SUCT LINE VT, Q1P17V279A _____ Initial
- 1A CCW PUMP VT Q1P17V156A _____ Initial

3.16 **INDEPENDENTLY VERIFY** the following are OPEN:

- 1A CCW PUMP SUCT Q1P17V109A _____ Initial
- 1A CCW PUMP DISCH ISO Q1P17V002A _____ Initial
- 1A CCW PUMP MINI-FLOW Q1P17V144A _____ Initial

3.17 On C-HSDP, **verify** 1A CCW Pump Local Remote Handswitch is in REMOTE. _____ Initial

3.18 **Rack in** 1A CCW Pump supply breaker Q1R15BKRDG04. _____ Initial

APPENDIX 10

RETURNING 1A CCW PUMP TO SERVICE AFTER MAINTENANCE
(Page 4 of 4)

3.19 **Turn** DC control power ON.

_____ Initial

3.20 **Verify** spring charges on 1A CCW Pump supply breaker Q1R15BKRDG04.

_____ Initial

3.21 **INDEPENDENTLY VERIFY** 1A CCW Pump Local Remote Handswitch is in REMOTE (C-HSDP).

_____ Initial

3.22 **INDEPENDENTLY VERIFY** 1A CCW Pump supply breaker Q1R15BKRDG04 is RACKED IN.

_____ Initial

3.23 **INDEPENDENTLY VERIFY** 1A CCW Pump supply breaker Q1R15BKRDG04 DC control power ON AND spring is CHARGED.

_____ Initial

3.24 IF required, THEN **perform** FNP-1-STP-23.1, COMPONENT COOLING WATER PUMP 1A INSERVICE TEST, and **record** cover page.

_____ Initial

Time / Date Stamp _____

APPENDIX 11

RETURNING 1B CCW PUMP TO SERVICE AFTER MAINTENANCE

Performed by: _____ Date _____

Reviewed by: _____ Date _____

This appendix consists of 5 pages

APPENDIX 11

RETURNING 1B CCW PUMP TO SERVICE AFTER MAINTENANCE

(Page 1 of 5)

1.0 PURPOSE

This appendix provides guidance for filling, venting, and aligning the 1B CCW pump for service after maintenance.

2.0 INITIAL CONDITIONS

2.1 The version of this procedure has been verified to be the current version. (OR 1-98-498)

_____ Initial

2.2 This procedure has been verified to be the correct unit for the task. (OR 1-98-498)

_____ Initial

2.3 1B CCW Pump A train supply breaker Q1R15BKRDF05 is racked out.

_____ Initial

2.4 1B CCW Pump B train supply breaker Q1R15BKRDG05 is racked out.

_____ Initial

3.0 INSTRUCTIONS

3.1 **Verify** pump and motor oil levels are 25% to 75%.

_____ Initial

3.2 **Verify** the following vent and drain valves are CLOSED AND CAPPED.

- 1B CCW PUMP DRN, Q1P17V157C

_____ Initial

- 1B CCW PUMP DRN, Q1P17V157D

_____ Initial

- 1B CCW PUMP VENT, Q1P17V156E

_____ Initial

- 1B CCW PUMP DISCH HDR DRN, Q1P17V281B

_____ Initial

3.3 **Verify** the following vent valves are CLOSED, but NOT capped. These valves will be used for venting.

- 1B CCW PUMP SUCT LINE VT, Q1P17V279B

_____ Initial

- 1B CCW PUMP VT, Q1P17V156B

_____ Initial

APPENDIX 11

RETURNING 1B CCW PUMP TO SERVICE AFTER MAINTENANCE

(Page 2 of 5)

3.4 **Check** 1B CCW PUMP SUCT Q1P17V109B closed. _____ Initial

3.5 **Check** 1B CCW PUMP DISCH ISO Q1P17V002B closed. _____ Initial

3.6 **Check** 1B CCW PUMP MINI-FLOW Q1P17V144B closed. _____ Initial

3.7 **Perform** the following at 1B CCW PUMP VT Q1P17V156B:

3.7.1 **Attach** hose to 1B CCW PUMP VT Q1P17V156B. _____ Initial

3.7.2 **Route** hose to suitable container. _____ Initial

3.7.3 **Open** 1B CCW PUMP VT Q1P17V156B. _____ Initial

3.8 **Perform** the following at 1B CCW PUMP SUCT LINE VT, Q1P17V279B:

3.8.1 **Attach** hose to 1B CCW PUMP SUCT LINE VT, Q1P17V279B. _____ Initial

3.8.2 **Route** hose to suitable container. _____ Initial

3.8.3 **Open** 1B CCW PUMP SUCT LINE VT, Q1P17V279B. _____ Initial

APPENDIX 11

RETURNING 1B CCW PUMP TO SERVICE AFTER MAINTENANCE

(Page 3 of 5)

NOTE

The mini-flow valve should be opened slowly to fill the pump. Opening of the valve too quickly can result in excessive pressure being placed on the mechanical seal.
AI 2009201838 ☐

3.9 **Perform** the following to fill 1B CCW PUMP:

3.9.1 **Notify** Control Room of filling of 1B CCW PUMP: _____ Initial

3.9.2 Slowly **throttle open** 1B CCW PUMP MINI-FLOW Q1P17V144B. _____ Initial

3.9.3 **Observe** 1B CCW PUMP VT Q1P17V156B, AND 1B CCW PUMP SUCT LINE VT, Q1P17V279B _____ Initial

3.9.4 WHEN air free water is observed at the valves, THEN **close** the following valves:

- 1B CCW PUMP VT Q1P17V156B _____ Initial
- 1B CCW PUMP SUCT LINE VT, Q1P17V279B _____ Initial

3.10 **Remove** hose AND **cap** 1B CCW PUMP SUCT LINE VT, Q1P17V279B. _____ Initial

3.11 **Remove** hose AND **cap** 1B CCW PUMP VT Q1P17V156B _____ Initial

3.12 **Open** 1B CCW PUMP MINI-FLOW Q1P17V144B _____ Initial

3.13 **Open** 1B CCW PUMP SUCT Q1P17V109B. _____ Initial

3.14 **Open** 1B CCW PUMP DISCH ISO Q1P17V002B. _____ Initial

3.15 **INDEPENDENTLY VERIFY** the following are CLOSED AND CAPPED:

- 1B CCW PUMP SUCT LINE VT, Q1P17V279B _____ Initial
- 1B CCW PUMP VT Q1P17V156B _____ Initial

APPENDIX 11

RETURNING 1B CCW PUMP TO SERVICE AFTER MAINTENANCE

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3.16 **INDEPENDENTLY VERIFY** the following are OPEN:

- 1B CCW PUMP SUCT Q1P17V109B _____ Initial
- 1B CCW PUMP DISCH ISO Q1P17V002B _____ Initial
- 1B CCW PUMP MINI-FLOW Q1P17V144B _____ Initial

3.17 On C-HSDP, **verify** 1B CCW Pump B train Local Remote Handswitch is in REMOTE. _____ Initial

3.18 On A-HSDP, **verify** 1B CCW Pump A train Local Remote Handswitch is in REMOTE. _____ Initial

3.19 IF desired to **align** 1B CCW pump to A Train, THEN **perform** the following:

3.19.1 **Rack in** the 1B CCW Pump A train supply breaker Q1R15BKRDF05. _____ Initial

3.19.2 **Turn** DC control power on. _____ Initial

3.19.3 **Verify** Q1R15BKRDF05 breaker spring charges. _____ Initial

3.20 IF desired to **align** 1B CCW pump to B Train, THEN **perform** the following:

3.20.1 **Rack in** the 1B CCW Pump B train supply breaker Q1R15BKRDG05. _____ Initial

3.20.2 **Turn** DC control power on. _____ Initial

3.20.3 **Verify** Q1R15BKRDG05 breaker spring charges. _____ Initial

APPENDIX 11

RETURNING 1B CCW PUMP TO SERVICE AFTER MAINTENANCE

(Page 5 of 5)

3.21 **INDEPENDENTLY VERIFY** the following:

- 1B CCW Pump B train Local Remote Handswitch is in REMOTE (C-HSDP).

_____ Initial

- 1B CCW Pump A train Local Remote Handswitch is in REMOTE (A-HSDP).

_____ Initial

3.22 IF aligned to A train, THEN **INDEPENDENTLY VERIFY** the 1B CCW Pump A train supply breaker RACKED IN.

3.22.1 **Verify** 1B CCW Pump A train supply breaker Q1R15BKRDF05 DC control power is ON.

_____ Initial

3.22.2 **Verify** 1B CCW Pump A train supply breaker Q1R15BKRDF05 breaker spring is CHARGED.

_____ Initial

3.23 IF aligned to B train, THEN **INDEPENDENTLY VERIFY** the 1B CCW Pump B train supply breaker RACKED IN.

3.23.1 **Verify** 1B CCW Pump B train supply breaker Q1R15BKRDG05 DC control power is ON.

_____ Initial

3.23.2 **Verify** 1B CCW Pump B train supply breaker Q1R15BKRDG05 breaker spring is CHARGED.

_____ Initial

3.24 IF required, THEN **perform** FNP-1-STP-23.2, Component Cooling Water Pump 1B INSERVICE TEST, AND **record** cover page.

_____ Initial

Time / Date Stamp _____

APPENDIX 12

RETURNING 1C CCW PUMP TO SERVICE AFTER MAINTENANCE

Performed by: _____ Date _____

Reviewed by: _____ Date _____

This appendix consists of 4 pages

APPENDIX 12
RETURNING 1C CCW PUMP TO SERVICE AFTER MAINTENANCE
(Page 1 of 4)

1.0 PURPOSE

This appendix provides guidance for filling, venting, and aligning the 1C CCW pump for service after maintenance.

2.0 INITIAL CONDITIONS

2.1 The version of this procedure has been verified to be the current version. (OR 1-98-498)

_____ Initial

2.2 This procedure has been verified to be the correct unit for the task. (OR 1-98-498)

_____ Initial

2.3 1C CCW Pump breaker Q1R15BKRDF04 is racked out.

_____ Initial

3.0 INSTRUCTIONS

3.1 **Verify** pump and motor oil levels are 25% to 75%.

_____ Initial

3.2 **Verify** the following vent and drain valves are CLOSED AND CAPPED.

- 1C CCW PUMP DRN, Q1P17V157F

_____ Initial

- 1C CCW PUMP DRN, Q1P17V157E

_____ Initial

- 1C CCW PUMP VENT, Q1P17V156F

_____ Initial

- 1C CCW PUMP DISCH HDR DRN, Q1P17V281C

_____ Initial

3.3 **Verify** the following vent valves are CLOSED, but NOT capped. These valves will be used for venting.

- 1C CCW PUMP SUCT LINE VT, Q1P17V279C

_____ Initial

- 1C CCW PUMP VT, Q1P17V156C

_____ Initial

3.4 **Check** 1C CCW PUMP SUCT ISO Q1P17V109C closed.

_____ Initial

3.5 **Check** 1C CCW PUMP DISCH ISO Q1P17V002C closed.

_____ Initial

APPENDIX 12
RETURNING 1C CCW PUMP TO SERVICE AFTER MAINTENANCE
(Page 2 of 4)

3.6 **Check** 1C CCW PUMP MINI-FLOW Q1P17V144C closed. _____ Initial

3.7 **Perform** the following at 1C CCW PUMP VT Q1P17V156C:

3.7.1 **Attach** hose to 1C CCW PUMP VT Q1P17V156C. _____ Initial

3.7.2 **Route** hose to suitable container. _____ Initial

3.7.3 **Open** 1C CCW PUMP VT Q1P17V156C. _____ Initial

3.8 **Perform** the following at 1C CCW PUMP SUCT LINE VT, Q1P17V279C:

3.8.1 **Attach** hose to 1C CCW PUMP SUCT LINE VT, Q1P17V279C. _____ Initial

3.8.2 **Route** hose to suitable container. _____ Initial

3.8.3 **Open** 1C CCW PUMP SUCT LINE VT, Q1P17V279C. _____ Initial

NOTE

The mini-flow valve should be opened slowly to fill the pump. Opening of the valve too quickly can result in excessive pressure being placed on the mechanical seal.
AI 2009201838 ☐

3.9 **Perform** the following to fill 1C CCW PUMP:

3.9.1 **Notify** Control Room of filling of 1C CCW PUMP: _____ Initial

3.9.2 Slowly **throttle open** 1C CCW PUMP MINI-FLOW Q1P17V144C. _____ Initial

3.9.3 **Observe** 1C CCW PUMP VT Q1P17V156C, AND 1C CCW PUMP SUCT LINE VT, Q1P17V279C. _____ Initial

3.9.4 WHEN air free water is observed at the valves, THEN **close** the following valves:

- 1C CCW PUMP VT Q1P17V156C _____ Initial
- 1C CCW PUMP SUCT LINE VT, Q1P17V279C _____ Initial

APPENDIX 12
RETURNING 1C CCW PUMP TO SERVICE AFTER MAINTENANCE
(Page 3 of 4)

3.10 **Remove** hose AND **cap** 1C CCW PUMP SUCT LINE VT, Q1P17V279C. _____ Initial

3.11 **Remove** hose AND **cap** 1C CCW PUMP VT Q1P17V156C _____ Initial

3.12 **Open** 1C CCW PUMP MINI-FLOW Q1P17V144C _____ Initial

3.13 **Open** 1C CCW PUMP SUCT Q1P17V109C. _____ Initial

3.14 **Open** 1C CCW PUMP DISCH ISO Q1P17V002C. _____ Initial

3.15 **INDEPENDENTLY VERIFY** the following are CLOSED AND CAPPED:

- 1C CCW PUMP SUCT LINE VT, Q1P17V279C _____ Initial
- 1C CCW PUMP VT Q1P17V156C _____ Initial

3.16 **INDEPENDENTLY VERIFY** the following are OPEN:

- 1C CCW PUMP SUCT Q1P17V109C _____ Initial
- 1C CCW PUMP DISCH ISO Q1P17V002C _____ Initial
- 1C CCW PUMP MINI-FLOW Q1P17V144C _____ Initial

3.17 On A-HSDP, **verify** 1C CCW Pump Local Remote Handswitch is in REMOTE. _____ Initial

3.18 **Rack in** 1C CCW Pump supply breaker Q1R15BKRDF04. _____ Initial

3.19 **Turn** DC control power ON. _____ Initial

3.20 **Verify** spring charges on 1C CCW Pump supply breaker Q1R15BKRDF04. _____ Initial

3.21 **INDEPENDENTLY VERIFY** 1C CCW Pump Local Remote Handswitch is in REMOTE (A-HSDP). _____ Initial

APPENDIX 12
RETURNING 1C CCW PUMP TO SERVICE AFTER MAINTENANCE
(Page 4 of 4)

3.22 **INDEPENDENTLY VERIFY** 1C CCW Pump supply breaker Q1R15BKRDF04 is RACKED IN.

_____
Initial

3.23 **INDEPENDENTLY VERIFY** 1C CCW Pump supply breaker Q1R15BKRDF04 DC control power ON AND spring is CHARGED.

_____
Initial

3.24 IF required, THEN **perform** FNP-1-STP-23.3, COMPONENT COOLING WATER PUMP 1C INSERVICE TEST, AND **record** cover page.

_____
Initial

Time / Date Stamp _____

APPENDIX 13

ALIGNING A TRAIN CCW
TO ALLOW OPERATION OF BOTH SFP COOLING TRAINS
DURING CORE OFFLOAD WITH A TRAIN SW OUT OF SERVICE

Performed by: _____ Date _____

Reviewed by: _____ Date _____

This appendix consists of 6 pages

APPENDIX 13

ALIGNING A TRAIN CCW TO ALLOW OPERATION OF BOTH
SFP COOLING TRAINS DURING CORE OFFLOAD WITH A TRAIN SW OUT OF SERVICE
(Page 1 of 6)

1.0 PURPOSE

Provide guidance to ensure A Train SFP Cooling has the necessary CCW cooling during core offload with A Train SW secured.

2.0 PRECAUTIONS AND LIMITATIONS

2.1 A Train room coolers will have no service water flow.

3.0 INITIAL CONDITIONS

3.1 The version of this procedure has been verified to be the current version. (OR 1-98-498)

_____ Initial

3.2 This procedure has been verified to be the correct unit for the task. (OR 1-98-498)

_____ Initial

3.3 The plant is in Mode 5 or 6.

_____ Initial

3.4 A Train CCW is secured.

_____ Initial

3.5 B Train is the On Service Train with 1A CCW Pump aligned to 1A CCW HX.

_____ Initial

3.6 The miscellaneous header has no component operating which requires cooling with the exception of charging pump miniflow lines.

_____ Initial

3.7 B Train Service Water is in operation per FNP-1-SOP-24.0, SERVICE WATER SYSTEM.

_____ Initial

3.8 Service Water is isolated to the turbine building.

_____ Initial

3.9 B Train Spent Fuel Pool Cooling is on service.

_____ Initial

3.10 A' Train Service Water outage is in progress or planned, and it is desired place A Train SFP Cooling in service per FNP-1-SOP-54.0, SPENT FUEL PIT COOLING AND PURIFICATION SYSTEM, Appendix 1.

_____ Initial

APPENDIX 13

ALIGNING A TRAIN CCW TO ALLOW OPERATION OF BOTH
SFP COOLING TRAINS DURING CORE OFFLOAD WITH A TRAIN SW OUT OF SERVICE
(Page 2 of 6)

3.11 1B CCW Pump has been verified aligned to B Train power supply per FNP-1-SOP-23.0B, SHIFTING ON SERVICE TRAIN FROM TRAIN A TO TRAIN B, steps 7.1 through 7.9.

_____ Initial

3.12 The DC control power switch for Q1R15BKRDG05 is OPEN.

_____ Initial

4.0 INSTRUCTIONS

4.1 **Align** B Train SW supply through 1B and 1A CCW HX simultaneously as follows:

4.1.1 **Verify** closed 1B CCW HX A TRN SW INLET HDR ISO, Q1P16V002C.

_____ Initial

4.1.2 **Verify** closed 1B CCW HX A TRN SW INLET HDR ISO, Q1P16V002D**.**

_____ Initial

4.1.3 **Verify** closed 1B CCW HX A TRN SW RTN HDR ISO, Q1P16V008D.

_____ Initial

4.1.4 **Verify** closed 1B CCW HX A TRN SW RTN HDR ISO, Q1P16V008E.

_____ Initial

4.1.5 **Verify** open 1B CCW HX B TRN SW INLET HDR ISO, Q1P16V002A.

_____ Initial

4.1.6 **Verify** open 1B CCW HX B TRN SW INLET HDR ISO, Q1P16V002B.

_____ Initial

4.1.7 **Verify** open 1B CCW HX B TRN SW RTN HDR ISO, Q1P16V008B.

_____ Initial

4.1.8 **Verify** open 1B CCW HX B TRN SW RTN HDR ISO, Q1P16V008C.

_____ Initial

4.1.9 **Open** SW TO 1B CCW HX Q1P16MOV3130B.

_____ Initial

APPENDIX 13

ALIGNING A TRAIN CCW TO ALLOW OPERATION OF BOTH
SFP COOLING TRAINS DURING CORE OFFLOAD WITH A TRAIN SW OUT OF SERVICE
(Page 3 of 6)

4.2 **Align** 1B CCW Pump and 1B CCW Heat Exchanger to A Train as follows:

4.2.1 **Close** CCW SUPPLY HDR XCONN, Q1P17V009A. _____ Initial

4.2.2 **Close** CCW SUPPLY HDR XCONN, Q1P17V009B. _____ Initial

4.2.3 **Close** CCW PUMPS DISCH HDR XCONN, Q1P17V003A. _____ Initial

4.2.4 **Close** CCW PUMPS DISCH HDR XCONN, Q1P17V003B. _____ Initial

4.2.5 **Close** CCW PUMPS SUCT HDR XCONN, Q1P17V110C. _____ Initial

4.2.6 **Close** CCW PUMPS SUCT HDR XCONN, Q1P17V110B. _____ Initial

4.2.7 **Open** CCW PUMPS SUCT HDR XCONN, Q1P17V110D _____ Initial

4.2.8 **Open** CCW PUMPS SUCT HDR XCONN, Q1P17V110E**.** _____ Initial

4.2.9 **Open** CCW SUPPLY HDR XCONN, Q1P17V009C. _____ Initial

4.2.10 **Open** CCW SUPPLY HDR XCONN, Q1P17V009D _____ Initial

4.2.11 **Open** CCW PUMPS DISCH HDR XCONN, Q1P17V003C. _____ Initial

4.2.12 **Open** CCW PUMPS DISCH HDR XCONN, Q1P17V003D _____ Initial

4.2.13 **Open** 1B CCW HX CCW OUTLET ISO, Q1P17V008B _____ Initial

4.2.14 **Close** 1C CCW HX CCW OUTLET ISO, Q1P17V008C. _____ Initial

4.2.15 **Close** DC control power switch for Q1R15BKRDG05 and check the breaker closing spring charged. _____ Initial

APPENDIX 13

ALIGNING A TRAIN CCW TO ALLOW OPERATION OF BOTH
SFP COOLING TRAINS DURING CORE OFFLOAD WITH A TRAIN SW OUT OF SERVICE
(Page 4 of 6)

4.3 **Place** 1B CCW heat exchanger on service as follows:

4.3.1 **Verify** SW FROM 1B CCW HX Q1P16FV3009B in MOD. Throttle 1B CCW HX DISCH FCV HIC 3009B as necessary to control CCW temperature.

_____ Initial

4.3.2 **Verify** open CCW TO 1A RHR HX Q1P17MOV3185A.

_____ Initial

4.3.3 **Start** 1B CCW PUMP AND **verify** flow increase on FI3043BA for the 1B CCW HX.

_____ Initial

NOTE

The 1B AND 1A CCW HXs are supplied from B Train SW. Adjusting 1B OR 1A CCW HX DISCH FCV, HIC 3009B or A affects B Train SW header pressure. ☐

4.3.4 **Maintain** CCW FROM CCW HX TEMP TI 3042B less than 105°F.

_____ Initial

NOTE

If the miscellaneous header is in service, it is aligned to the 1B CCW HX which is aligned to A Train CCW. ☐

4.3.5 IF desired, THEN after system is stable, **close** CCW to 1A RHR HX Q1P17MOV3185A.

_____ Initial

APPENDIX 13

ALIGNING A TRAIN CCW TO ALLOW OPERATION OF BOTH
SFP COOLING TRAINS DURING CORE OFFLOAD WITH A TRAIN SW OUT OF SERVICE
(Page 5 of 6)

4.4 Restoration to normal alignment after the A Train of SFP cooling has been secured.

4.4.1 **Verify** miscellaneous header has no component operating which requires cooling with the exception of charging pump miniflow lines.

_____ Initial

4.4.2 IF any charging pump running, THEN **verify** total charging flow ≥ 60 gpm.

_____ Initial

NOTE

The following step stops all A Train CCW Flow. ☐

4.4.3 **Secure** the 1B CCW Pump.

_____ Initial

4.4.4 IF available, THEN **verify** open CCW to 1A RHR HX Q1P17MOV3185A.

_____ Initial

4.4.5 **Open** the DC control power switch for Q1R15BKRDG05.

_____ Initial

4.4.6 **Close** SW TO 1B CCW HX Q1P16MOV3130B.

_____ Initial

NOTE

The following sequence aligns the miscellaneous header to B Train CCW. ☐

4.4.7 **Close** 1B CCW HX CCW OUTLET ISO, Q1P17V008B.

_____ Initial

4.4.8 **Open** 1C CCW HX CCW OUTLET ISO, Q1P17V008C.

_____ Initial

4.4.9 **Close** CCW SUPPLY HDR XCONN, Q1P17V009C.

_____ Initial

4.4.10 **Close** CCW SUPPLY HDR XCONN, Q1P17V009D.

_____ Initial

APPENDIX 13

ALIGNING A TRAIN CCW TO ALLOW OPERATION OF BOTH
SFP COOLING TRAINS DURING CORE OFFLOAD WITH A TRAIN SW OUT OF SERVICE
(Page 6 of 6)

4.4.11 **Close** CCW PUMPS DISCH HDR XCONN, Q1P17V003C. _____ Initial

4.4.12 **Close** CCW PUMPS DISCH HDR XCONN, Q1P17V003D. _____ Initial

4.4.13 **Close** CCW PUMPS SUCT HDR XCONN, Q1P17V110D. _____ Initial

4.4.14 **Close** CCW PUMPS SUCT HDR XCONN, Q1P17V110E. _____ Initial

4.4.15 **Open** CCW PUMPS SUCT HDR XCONN, Q1P17V110C. _____ Initial

4.4.16 **Open** CCW PUMPS SUCT HDR XCONN, Q1P17V110B. _____ Initial

4.4.17 **Open** CCW PUMPS DISCH HDR XCONN, Q1P17V003A. _____ Initial

4.4.18 **Open** CCW PUMPS DISCH HDR XCONN, Q1P17V003B. _____ Initial

4.4.19 **Open** CCW SUPPLY HDR XCONN, Q1P17V009A. _____ Initial

4.4.20 **Open** CCW SUPPLY HDR XCONN, Q1P17V009B. _____ Initial

4.4.21 **Close** DC control power switch for Q1R15BKRDG05. _____ Initial

4.4.21.1 **Check** the breaker closing spring charged. _____ Initial

4.4.22 IF desired, THEN **verify** CCW alignment with B Train on service by performing a walkthrough of FNP-1-SOP-23.0B, SHIFTING ON SERVICE TRAIN FROM TRAIN A TO TRAIN B, Sections 2.0, 3.0 and 4.0. _____

APPENDIX 14

ALIGNING B CCW PUMP AND B CCW HX TO A TRAIN WITH C CCW PUMP AND C CCW HX NOT AVAILABLE OR NOT IN SERVICE

Performed by: _____ Date _____

Reviewed by: _____ Date _____

This appendix consists of 9 pages

APPENDIX 14

ALIGNING B CCW PUMP AND B CCW HX TO A TRAIN
WITH C CCW PUMP AND C CCW HX NOT AVAILABLE OR NOT IN SERVICE
(Page 1 of 9)

1.0 PURPOSE

This appendix provides guidance for aligning the 1B CCW Pump and the 1B CCW Heat Exchanger to the B Train when the 1C CCW Pump and the 1C CCW Heat Exchanger are out of service or unavailable for service.

2.0 PRECAUTIONS AND LIMITATION

2.1 Any operations involving manipulation of the 4kV disconnect switches associated shall include visual confirmation of the following:

2.1.1 The main contacts are in the required state, open or closed. (One contact per phase.) Refer to figure 1 and 2.

2.1.2 The arcing contacts are in the required state, open or closed. (One contact per phase.) Refer to figure 1 and 2.

3.0 INITIAL CONDITIONS

3.1 The version of this appendix has been verified to be the current version. (OR 1-98-498)

_____ Initial

3.2 The appendix has been verified to be the correct unit for the task. (OR 1-98-498)

_____ Initial

3.3 1B CCW Pump and 1B CCW Heat Exchanger are currently aligned to B CCW train.

_____ Initial

3.4 “B” Train CCW is aligned for service per FNP-1-SOP-23.0A with acceptable line up deviation documented.

_____ Initial

3.5 The Miscellaneous header is not required to be in service during the performance of this appendix.

_____ Initial

3.6 The reactor is defueled.

_____ Initial

APPENDIX 14

ALIGNING B CCW PUMP AND B CCW HX TO A TRAIN
WITH C CCW PUMP AND C CCW HX NOT AVAILABLE OR NOT IN SERVICE
(Page 2 of 9)

4.0 INSTRUCTIONS

4.1 IF required, THEN **place** the 1A CCW Pump in service on B Train as follows:

NOTE

Step 4.1.1 is performed to minimize the pressure transient which could otherwise result in CCW to Thermal Barrier HX isolation. ☐

CAUTION

The operation of two pumps through one HX is not allowed. ☐

4.1.1 IF not previously aligned, THEN **open** CCW TO 1B RHR HX Q1P17MOV3185B

_____ Initial

4.1.2 Simultaneously **start** the Standby 1A CCW Pump AND **stop** the on service 1B CCW Pump.

_____ Initial

4.1.3 IF not required for RHR operations, WHEN the system has stabilized, THEN **close** CCW TO 1B RHR HX, Q1P17MOV3185.

_____ Initial

APPENDIX 14

ALIGNING B CCW PUMP AND B CCW HX TO A TRAIN
WITH C CCW PUMP AND C CCW HX NOT AVAILABLE OR NOT IN SERVICE
(Page 3 of 9)

4.2 **Verify** 1C CCW Pump and 1C CCW Heat Exchanger isolated:

4.2.1 **Verify** 1C CCW Pump and heat exchanger is out of service AND isolated by an appropriate tagging order, _____ Initial

OR

4.2.2 **Perform** the following steps:

4.2.2.1 **Verify** Q1R15BKRDF04, COMPONENT COOLING WATER PUMP 1C 52-DF04 is RACKED OUT. _____ Initial

4.2.2.2 **Verify** that 1C CCW HX CCW OUTLET ISO, Q1P17V008C is CLOSED. _____ Initial

4.3 **Align** 1B CCW Pump and 1B CCW Heat Exchanger to A Train as follows:

4.3.1 **Close** CCW SUPPLY HDR XCONN, Q1P17V009A. _____ Initial

4.3.2 **Close** CCW SUPPLY HDR XCONN, Q1P17V009B. _____ Initial

4.3.3 **Close** CCW PUMPS DISCH HDR XCONN, Q1P17V003A. _____ Initial

4.3.4 **Close** CCW PUMPS DISCH HDR XCONN, Q1P17V003B. _____ Initial

4.3.5 **Open** CCW PUMPS SUCT HDR XCONN, Q1P17V110D. _____ Initial

4.3.6 **Open** CCW PUMPS SUCT HDR XCONN, Q1P17V110E. _____ Initial

APPENDIX 14

ALIGNING B CCW PUMP AND B CCW HX TO A TRAIN
WITH C CCW PUMP AND C CCW HX NOT AVAILABLE OR NOT IN SERVICE
(Page 4 of 9)

4.3.7 **Close** CCW PUMPS SUCT HDR XCONN, Q1P17V110C. _____ Initial

4.3.8 **Close** CCW PUMPS SUCT HDR XCONN, Q1P17V110B. _____ Initial

4.3.9 **Open** CCW PUMPS DISCH HDR XCONN, Q1P17V003C. _____ Initial

4.3.10 **Open** CCW PUMPS DISCH HDR XCONN, Q1P17V003D. _____ Initial

4.3.11 **Open** CCW SUPPLY HDR XCONN, Q1P17V009C. _____ Initial

4.3.12 **Open** CCW SUPPLY HDR XCONN, Q1P17V009D. _____ Initial

4.3.13 **Open** 1B CCW HX CCW OUTLET ISO, Q1P17V008B _____ Initial

APPENDIX 14

ALIGNING B CCW PUMP AND B CCW HX TO A TRAIN
WITH C CCW PUMP AND C CCW HX NOT AVAILABLE OR NOT IN SERVICE
(Page 5 of 9)

4.4 **Align** SW to the 1B CCW Heat Exchanger as follows:

4.4.1 **Close** 1B CCW HX B TRN SW INLET HDR ISO, Q1P16V002B. _____ Initial

4.4.2 **Close** 1B CCW HX B TRN SW INLET HDR ISO, Q1P16V002A. _____ Initial

4.4.3 **Close** 1B CCW HX B TRN SW RTN HDR ISO, Q1P16V008C. _____ Initial

4.4.4 **Close** 1B CCW HX B TRN SW RTN HDR ISO, Q1P16V008B _____ Initial

4.4.5 **Open** 1B CCW HX A TRN SW INLET HDR ISO, Q1P16V002C. _____ Initial

4.4.6 **Open** 1B CCW HX A TRN SW INLET HDR ISO, Q1P16V002D. _____ Initial

4.4.7 **Open** 1B CCW HX A TRN SW RTN HDR ISO, Q1P16V008E. _____ Initial

4.4.8 **Open** 1B CCW HX A TRN SW RTN HDR ISO, Q1P16V008D. _____ Initial

4.4.9 **Verify** SW FROM 1B CCW HX Q1P16FV3009B handswitch is in MOD. _____ Initial

4.4.10 **Verify** 1B CCW HX DISCH FCV HIC 3009B is demanding the valve to be fully closed (100% demand). _____ Initial

4.4.11 Locally **verify** SW FROM 1B CCW HX Q1P16FV3009B CLOSED. _____ Initial

4.4.12 **Open** SW TO 1B CCW HX Q1P16MOV3130B. _____ Initial

APPENDIX 14

ALIGNING B CCW PUMP AND B CCW HX TO A TRAIN
WITH C CCW PUMP AND C CCW HX NOT AVAILABLE OR NOT IN SERVICE
(Page 6 of9)

4.4.13 **Throttle open** 1B CCW HX DISCH FCV HIC 3009B WHILE **throttling closed** 1C CCW HX DISCH FCV HIC 3009C maintaining existing service water pressure.

Initial

4.4.14 **Verify** 1C CCW HX DISCH FCV HIC 3009C fully closed.

Initial

4.4.15 **Close** SW TO 1C CCW HX Q1P16MOV3130C.

Initial

4.5 **Align** B CCW Pump to A Train electrically as follows.

CAUTION
Breaker Q1R15BKRDG05 has alternate DC control power supplied through fuses in C-HSDP when 1B CCW PUMP LOCAL-REMOTE switch on C-HSDP is in LOCAL. ☐

4.5.1 **Verify** LOCAL-REMOTE switch on C-HSDP for 1B CCW PUMP in REMOTE.

Initial

4.5.2 **Perform** the following for breaker Q1R15BKRDG05.

4.5.2.1 **Rackout** breaker Q1R15BKRDG05.

Initial

4.5.2.2 **Turn** key #RE-14291 in the mechanical interlock on circuit breaker Q1R15BKRDG05.

Initial

4.5.2.3 **Remove** key #RE-14291.

Initial

4.5.3 **Insert** key #RE-14291 into the mechanical interlock on 1B CCW pump 4KV disconnect switch 1B (Q1R18A004B-B).

Initial

4.5.4 **Turn** Key #RE-14291. Key #RE-14291 is now held in place.

Initial

APPENDIX 14

ALIGNING B CCW PUMP AND B CCW HX TO A TRAIN
WITH C CCW PUMP AND C CCW HX NOT AVAILABLE OR NOT IN SERVICE
(Page 7 of 9)

4.6 **Perform** the following for 1B CCW pump 4KV disconnect switch 1B (Q1R18A004B-B).

4.6.1 **Open** disconnect switch Q1R18A004B-B. _____ Initial

4.6.2 **Check** the position indicator reads SW OPEN. _____ Initial

4.6.3 With the aid of a flashlight, **perform** the following:

4.6.3.1 **Check** that a visible air gap exists between the main contacts on all three phases. _____ Initial

4.6.3.2 **Check** that a visible air gap exists between the arcing contacts on all three phases. _____ Initial

4.6.4 **Turn** key #RE-14224 in its mechanical interlock on 1B disconnect switch. _____ Initial

4.6.5 **Remove** key #RE-14224. 1B disconnect switch is now locked in the open position. _____ Initial

APPENDIX 14

ALIGNING B CCW PUMP AND B CCW HX TO A TRAIN
WITH C CCW PUMP AND C CCW HX NOT AVAILABLE OR NOT IN SERVICE
(Page 8 of 9)

4.7 **Perform** the following for 1B CCW pump 4 KV disconnect switch 1A (Q1R18A004A-A).

4.7.1 **Insert** key #RE-14224 into its mechanical interlock on 1B CCW pump 4 KV disconnect switch 1A (Q1R18A004A-A). _____ Initial

4.7.2 **Turn** Key #RE-14224. Key #RE-14224 is now held in place. _____ Initial

4.7.3 **Close** disconnect switch, Q1R18A004A-A. _____ Initial

4.7.4 **Check** the position indicator reads SW CLOSED. _____ Initial

4.7.5 With the aid of a flashlight, **perform** the following:

4.7.5.1 **Check** that NO air gap exists for the main contacts on all three phases. (Contacts closed.) _____ Initial

4.7.5.2 **Check** that NO air gap exists for the arcing contacts on all three phases. (Contacts closed.) _____ Initial

4.7.6 **Turn** key #RE-14265 in its mechanical interlock AND **remove** it. 1A disconnect switch is now locked in the closed position. _____ Initial

4.8 **Insert** key #RE-14265 into its mechanical interlock on circuit breaker Q1R15BKRDF05 AND turn key. Key #RE-14265 is now held in place. _____ Initial

4.9 **Rack** circuit breaker Q1R15BKRDF05 to the CONNECTED position. _____ Initial

4.10 **Close** DC control power switch for Q1R15BKRDF05 AND verify breaker spring charges. _____ Initial

4.11 1B CCW Hx and pump are now aligned to A Train, IF desired, THEN **place** 1B CCW pump and heat exchanger in service. _____ Initial

APPENDIX 14

ALIGNING B CCW PUMP AND B CCW HX TO A TRAIN
WITH C CCW PUMP AND C CCW HX NOT AVAILABLE OR NOT IN SERVICE

(Page 9 of 9)

NOTES

1B CCW Hx and Pump are now aligned to A Train and can be placed in service if required.

At a minimum, the 1B CCW Pump should be “bumped” to cycle the breaker for verifying operability following the racking process. ☐

4.12 **Open** CCW TO 1A RHR HX Q1P17MOV3185A.

_____ Initial

4.13 **Start** the 1B CCW Pump.

_____ Initial

4.14 IF not required for RHR operations, THEN **close** CCW TO 1A RHR HX, Q1P17MOV3185A, WHEN the system has stabilized.

_____ Initial

4.15 **Throttle** 1B CCW HX DISCH FCV HIC 3009B as required to control CCW temperature.

_____ Initial

APPENDIX 15

ENABLING THE 1B CCW PUMP
TO AUTO-START FOR 1C CCW PUMP

Completed By: _____ Date _____

SSS Reviewed By: _____ Date _____

This appendix consists of 3 pages

APPENDIX 15
ENABLING THE 1B CCW PUMP
TO AUTO-START FOR 1C CCW PUMP
(Page 1 of 3)

1.0 PURPOSE

To enable the 1B CCW Pump to auto start during an ESF actuation, when the 1C CCW Pump is available but not operable. (AI 2009205760)

2.0 PRECAUTIONS AND LIMITATIONS

All jumpers must be installed in accordance with NMP-MA-018, Plant Electrical Component Temporary Configuration Control.

3.0 INITIAL CONDITIONS

3.1 The version of this procedure has been verified to be the current version. (OR 1-98-498).

_____ Initial

3.2 This procedure has been verified to be the correct unit for the task (OR 1-98-498).

_____ Initial

3.3 The 1C CCW Pump has been declared inoperable, but is available for operation.

_____ Initial

3.4 The electrical distribution system is energized for normal operation per FNP-1-SOP-36.0, PLANT ELECTRICAL DISTRIBUTION LINE-UP, with exceptions noted.

_____ Initial

3.5 CCW pump room coolers are in service per FNP-1-SOP-58.0, AUXILIARY BUILDING HVAC SYSTEM.

_____ Initial

3.6 Electrical Maintenance personnel are available to perform the actions required to implement this appendix

_____ Initial

APPENDIX 15
ENABLING THE 1B CCW PUMP
TO AUTO-START FOR 1C CCW PUMP
(Page 2 of 3)

4.0 INSTRUCTIONS

NOTES

Performance of the following will:

Defeat the auto-start functions for 1C CCW Pump from a SI/LOSP signal

Defeat the auto-start functions for 1C CCW Pump from an overload trip of the 1B CCW Pump.

Cause the 1B CCW Pump to receive an auto-start signal from the A Train SI and LOSP sequencer.

Have no effect on the start/stop operation of the 1C or 1B CCW Pumps from the MCB.

Have no effect on the load shed circuitry for the 1C or 1B CCW Pumps.

Have no effect on HSDP operation for the 1C or 1B CCW Pumps.

Have no effect on any CCW Pump room cooler operation. ☐

4.1 **Defeat** the normal auto-start circuitry and breaker interlock of the 1C CCW Pump by performing the following:

4.1.1 In termination cabinet Q1H25L010-A, Panel 1, **open** link TB2-11.

_____ EM

_____ CV Initial

4.1.2 In termination compartment above 1C CCW PUMP breaker Q1R15BKRDF04, **install** a jumper between TERMINAL BLOCK SS1-9 and SS1-10 per NMP-MA-018, Plant Electrical Component Temporary Configuration Control. .

_____ EM

_____ CV Initial

4.1.3 **Notify** the control room of the time the above actions have been completed.

_____ EM

Time _____

APPENDIX 15
ENABLING THE 1B CCW PUMP
TO AUTO-START FOR 1C CCW PUMP
(Page 3 of 3)

4.2 When requested by the Shift Supervisor to restore the normal auto-start circuitry and breaker interlock for the 1C CCW Pump, **perform** the following:

4.2.1 In termination compartment above 1C CCW PUMP breaker Q1R15BKRDF04, **remove** the jumper between TERMINAL BLOCK SS1-9 and SS1-10 per NMP-MA-018, Plant Electrical Component Temporary Configuration Control. .

_____ EM

_____ CV Initial

4.2.2 In termination cabinet Q1H25L010-A, Panel 1, **close** TB2-11. .

_____ EM

_____ CV Initial

4.2.3 **Notify** the control room of the time the above actions have been completed.

_____ EM

Time _____

5.0 REFERENCES

5.1 D177183, Sheet 1-ELEMENTARY DIAGRAM COMPONENT COOLING WATER PUMP 1C

5.2 D177184, Sheet 1-ELEMENTARY DIAGRAM - COMPONENT COOLING WATER PUMP 1A

5.3 D177185, Sheet 1-ELEMENTARY DIAGRAM - COMPONENT COOLING WATER PUMP 1B - TRAIN A

5.4 D177187, Sheet 1-ELEMENTARY DIAGRAM - COMPONENT COOLING WATER PUMP 1B - TRAIN "B"

5.5 D181509, Sheet 1-CONN DIAG-4160V SWGR BUS 1F COMP DF04 THRU DF06

5.6 D181514, Sheet 1-CONN. DIAG.-4160V SWGR. BUS 1G COMPT. DG04, DG05, DG06-Q1R15 A007-B

5.7 D181515, Sheet 1-CONNECTION DIAGRAM 4160V SWGR BUS 1G COMPT DG07, DG08, DG09 Q1R15A007-B

D181839, Sheet 1-TERMINATION CABINET 31-B FRONT CONNECTION DIAGRAM - Q1H25L031-B

APPENDIX 16

ENABLING THE 1B CCW PUMP
TO AUTO-START FOR 1A CCW PUMP

Completed By: _____ Date _____

SSS Reviewed By: _____ Date _____

This appendix consists of 3 pages

APPENDIX 16
ENABLING THE 1B CCW PUMP TO AUTO-START FOR 1A CCW PUMP
(Page 1 of 3)

1.0 PURPOSE

To enable the 1B CCW Pump to auto start during an ESF actuation, when the 1A CCW Pump is available but not operable. (AI 2009205760)

2.0 PRECAUTIONS AND LIMITATIONS

All jumpers must be installed in accordance with NMP-MA-018, Plant Electrical Component Temporary Configuration Control.

3.0 INITIAL CONDITIONS

3.1 The version of this procedure has been verified to be the current version. (OR 1-98-498).

_____ Initial

3.2 This procedure has been verified to be the correct unit for the task. (OR 1-98-498).

_____ Initial

3.3 The 1A CCW Pump has been declared inoperable, but is available for operation.

_____ Initial

3.4 The electrical distribution system is energized for normal operation per FNP-1-SOP-36.0, PLANT ELECTRICAL DISTRIBUTION LINE-UP, with exceptions noted.

_____ Initial

3.5 CCW pump room coolers are in service per FNP-1-SOP-58.0, AUXILIARY BUILDING HVAC SYSTEM.

_____ Initial

3.6 Electrical Maintenance personnel are available to perform the actions required to implement this appendix.

_____ Initial

APPENDIX 16
ENABLING THE 1B CCW PUMP TO AUTO-START FOR 1A CCW PUMP
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4.0 INSTRUCTIONS

NOTES

Performance of the following will:

Defeat the auto-start functions for 1A CCW Pump from a SI/LOSP signal

Defeat the auto-start functions for 1A CCW Pump from an overload trip of the 1B CCW Pump.

Cause the 1B CCW Pump to receive an auto-start signal from the B Train SI and LOSP sequencer.

Have no effect on the start/stop operation of the 1B or 1A CCW Pumps from the MCB.

Have no effect on the load shed circuitry for the 1B or 1A CCW Pumps.

Have no effect on HSDP operation for the 1B or 1A CCW Pumps.

Have no effect on any CCW Pump room cooler operation. ☐

4.1 **Defeat** the normal auto-start circuitry and breaker interlock of the 1A CCW Pump by performing the following:

4.1.1 In termination cabinet Q1H25L031-B, Panel 1, **open** link TB2-22.

_____ EM

_____ CV Initial

4.1.2 In termination compartment above 1A CCW PUMP breaker Q1R15BKRDG04, **install** a jumper between TERMINAL BLOCK SS1-9 and SS1-10 per NMP-MA-018, Plant Electrical Component Temporary Configuration Control.

_____ EM

_____ CV Initial

4.1.3 **Notify** the control room of the time the above actions have been completed.

_____ EM

Time _____

APPENDIX 16
ENABLING THE 1B CCW PUMP TO AUTO-START FOR 1A CCW PUMP
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4.2 When requested by the Shift Supervisor to restore the normal auto-start circuitry and breaker interlock for the 1A CCW Pump, **perform** the following:

4.2.1 In termination compartment above 1A CCW PUMP breaker Q1R15BKRDG04, **remove** the jumper between TERMINAL BLOCK SS1-9 and SS1-10 per NMP-MA-018, Plant Electrical Component Temporary Configuration Control.

_____ EM

_____ Initial

4.2.2 In termination cabinet Q1H25L031-B, Panel 1, **close** link TB2-22

_____ EM

_____ Initial

4.2.3 **Notify** the control room of the time the above actions have been completed.

_____ EM

Time _____

5.0 REFERENCES

5.1 D177183, Sheet 1-ELEMENTARY DIAGRAM COMPONENT COOLING WATER PUMP 1C

5.2 D177184, Sheet 1-ELEMENTARY DIAGRAM - COMPONENT COOLING WATER PUMP 1A

5.3 D177185, Sheet 1-ELEMENTARY DIAGRAM - COMPONENT COOLING WATER PUMP 1B - TRAIN "A"

5.4 D177187, Sheet 1-ELEMENTARY DIAGRAM - COMPONENT COOLING WATER PUMP 1B - TRAIN "B"

5.5 D181509, Sheet 1-CONN DIAG-4160V SWGR BUS 1F COMP DF04 THRU DF06

5.6 D181514, Sheet 1-CONN. DIAG.-4160V SWGR. BUS 1G COMPT. DG04, DG05, DG06-Q1R15 A007-B

5.7 D181515, Sheet 1-CONNECTION DIAGRAM 4160V SWGR BUS 1G COMPT DG07, DG08, DG09 Q1R15A007-B

5.8 D181839, Sheet 1-TERMINATION CABINET 31-B FRONT CONNECTION DIAGRAM - Q1H25L031-B

LOCATION AA3

SETPOINT: Variable Current/Time

ORIGIN:
1. Ø1, Ø2, or Ø3 Overcurrent Relay (50/51 - DF04).
2. Ground Relay (50G-DF04).

A3
1C CCW PUMP OVERLOAD TRIP

PROBABLE CAUSE

1. 1C CCW Pump overloaded.
2. 1C CCW Pump electrical or mechanical fault.

AUTOMATIC ACTION

1. Trips breaker DF04 for 1C CCW Pump.
2. Closes breaker DF05 to start 1B CCW Pump, if 1B CCW Pump is aligned to A Train.

OPERATOR ACTION

1. Check 1C CCW PUMP has tripped. ☐
2. Verify standby pump running, if aligned to affected train. ☐
3. Perform the actions required by FNP-1-AOP-9.0, LOSS OF COMPONENT COOLING WATER. ☐
4. IF 1B CCW Pump is aligned to A Train, THEN rack out 1C CCW Pump supply breaker Q1R15BKRDF04. ☐
5. Refer to Technical Specification 3.7.7 for LCO requirements with a loss of the on service train of component cooling water. ☐

References: D-177183; D-177185; A-177048, Sh. 255; B-175810, Sh. 22; A-177100, Sh. 53; Technical Specification 3.7.7

FARLEY NUCLEAR PLANT

ABNORMAL OPERATING PROCEDURE

FNP-1-AOP-9.0

SAFETY RELATED

LOSS OF COMPONENT COOLING WATER

PROCEDURE LEVEL OF USE CLASSIFICATION PER NMP-AP-003	
CATEGORY	**SECTIONS**
Continuous:	**ALL**
Reference:	**NONE**
Information:	**NONE**

Approved:

David L Reed (for)
Operations Manager

Effective Date: 02/01/2014

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A. Purpose

This procedure provides actions for response to a loss of an operating component cooling water train.

This procedure is applicable at all times.

B. Symptoms or Entry Conditions

I. This procedure is entered when a loss of component cooling water is indicated by any of the following:

a. Trip of any operating CCW PUMP

b. Loss of SW supply to an operating CCW train

Step	Action/Expected Response	Response Not Obtained

****

CAUTION: To prevent pump damage the 86 lockout relay for a faulted CCW PUMP must not be reset until the cause of the fault has been determined. Placing the affected CCW PUMP handswitch to STOP will reset this relay.

****

NOTE:
- The standby CCW PUMP will automatically start if the pump in the train it is aligned to trips due to electrical overload.
- The term "on service train" refers to the train which is aligned to supply the miscellaneous header.

__ **1 Verify CCW pump started in affected train.**

1 IF CCW cooling lost to running charging pump,
THEN perform the following:

1.1 Verify CCW pump started in the non affected train.

1.2 IF CCW pump running in non affected train,
THEN start charging pump in non affected train.

1.3 IF charging pump started in non affected train,
THEN stop charging pump in affected train.

__Page Completed

Step	Action/Expected Response	Response Not Obtained

NOTE:
- If seal cooling is lost, it will be necessary to trip the RCP(s) within two minutes for a #1 seal leak rate of 5 gpm reducing to 42 seconds for a #1 seal leak rate of 7 gpm, to ensure that the RCP(s) stop rotating prior to actuation of the shutdown seal. (#1 seal leak rate is defined as #1 seal leakoff flow plus #2 seal leakoff flow).
- IF RCP motor bearing temperatures exceed 195°F, THEN the ON SERVICE train is affected.
- Adequate CCW flow means sufficient cooling is available to maintain acceptable temperatures. (i.e. charging pumps, RHR cooling, SFP cooling, RCP's etc.)
- Indications of pump cavitation are: Abnormal CCW flow oscillations or cavitation noise reported at the pump.
- When transitioning to FNP-1-EEP-0, REACTOR TRIP OR SAFETY INJECTION, AND at the Shift Supervisors direction, it is ACCEPTABLE for one team member to complete the Immediate Operator Actions of FNP-1-EEP-0, while the other team member verifies the reactor trip, THEN trips the RCPs before finishing the Immediate Operator Actions of FNP-1-EEP-0.

__ **2 [CA] Check cooling adequate for continued plant support.**

- Check CCW flow adequate in affected train.
- Check RCP motor bearing temperatures less than 195°F.
- Check CCW pump not cavitating. Stop any cavitating CCW pump.
- CCW Surge tank level being maintained at or above 13 inches.
- RCP seal injection to all RCPs greater than 6 gpm.

2 Perform the following:

2.1 IF the ON SERVICE train is affected, THEN perform the following:

2.1.1 IF the reactor is critical, THEN trip the reactor and perform, FNP-1-EEP-0, REACTOR TRIP OR SAFETY INJECTION, while continuing with this procedure.

2.1.2 Verify all Reactor Coolant pumps stopped.

2.1.3 IF in Mode 3 or 4, THEN perform FNP-1-AOP-4.0, LOSS OF REACTOR COOLANT FLOW while continuing with procedure.

° Step 2 continued on next page

__Page Completed

Step	Action/Expected Response	Response Not Obtained

NOTE: Indications of CCW pump cavitation will be abnormal CCW flow oscillations or cavitation noise reported at the pump.

2.2 IF evidence of CCW pump cavitation exists,
THEN stop affected CCW pump.

2.3 IF CCW cooling lost to running charging pump,
THEN perform the following:

2.3.1 Verify CCW pump started in the non affected train.

2.3.2 IF CCW pump running in non affected train,
THEN start charging pump in non affected train.

2.3.3 IF charging pump started in non affected train,
THEN stop charging pump in affected train.

2.3.4 IF charging pump running in affected train AND not required,
THEN stop charging pump in affected train.

2.3.5 IF all charging secured,
THEN isolate letdown.

° Step 2 continued on next page

__Page Completed

Step	Action/Expected Response	Response Not Obtained

****

CAUTION: IF seal injection is in service, THEN at least one charging pump must be maintained to support RCP's.

****

NOTE: IF necessary to swap train alignment for the 1B charging pump for continued support of plant operations, THEN it is desirable to have separate operators performing the electrical and mechanical alignments simultaneously.

2.4 IF required to establish an operable charging pump in the non affected train, THEN shift the B charging pump to the non affected train per FNP-1-SOP-2.1, CHEMICAL AND VOLUME CONTROL SYSTEM PLANT STARTUP AND OPERATION Appendix A or Appendix B.

2.5 IF CCW is NOT available to support charging operation, THEN align fire water using ATTACHMENT 1, ESTABLISHING FIREWATER COOLING TO A CHARGING PUMP.

2.6 IF CCW cooling to a running RHR pump is inadequate, THEN perform the following.

2.6.1 Stop the affected RHR pump.

2.6.2 IF in Mode 5 or 6, THEN perform FNP-1-AOP-12.0, RESIDUAL HEAT REMOVAL SYSTEM MALFUNCTION, in conjunction with this procedure.

Step	Action/Expected Response	Response Not Obtained

NOTE: The ON SERVICE train includes the miscellaneous header and associated train header.

__ **3 Verify SW flow supplied to the ON SERVICE train.**

CCW HX SW DISCH
[ ] Q1P16FI3009AA 1A CCW HX DISC
[ ] Q1P16FI3009BA 1B CCW HX DISC
[ ] Q1P16FI3009CA 1C CCW HX DISC

3 IF Service Water is not available, THEN perform the following in conjunction with FNP-1-AOP-10.0, LOSS OF SERVICE WATER.

3.1 Check the following conditions met for swapping ON SERVICE trains.

[ ] Affected train is the ON SERVICE train.
[ ] Unaffected train has adequate SW available.
[ ] No CCW leak exists

3.2 IF conditions for swapping ON SERVICE trains met, THEN swap ON SERVICE trains per FNP-1-SOP-23.0, COMPONENT COOLING WATER SYSTEM Appendix B or Appendix C.

NOTE: IF previous actions have restored the ON SERVICE train, THEN the ON SERVICE train should no longer be considered affected.

__ **4 Check ON SERVICE train affected.**

4 Go to step 9.

__ **5 Check the ON SERVICE train intact.**

5 Perform the following:

5.1 IF the miscellaneous header is intact, THEN shift the miscellaneous header to the non-affected train using ATTACHMENT 2, PLACING 1B CCW PUMP ON A TRAIN or ATTACHMENT 3, PLACING 1B CCW PUMP ON B TRAIN depending upon train affected.

° Step 5 continued on next page

__Page Completed

Step	Action/Expected Response	Response Not Obtained
		5.1.1 WHEN ATTACHMENT 2, or ATTACHMENT 3, complete, THEN go to step 7.
		5.2 IF the miscellaneous header is not intact, THEN proceed to step 7.
__	**6 Check 1A AND 1C CCW pumps AVAILABLE.**	6 Shift the Miscellaneous header to the non-affected train using ATTACHMENT 2, PLACING 1B CCW PUMP ON A TRAIN or ATTACHMENT 3, PLACING 1B CCW PUMP ON B TRAIN AND proceed to step 7.
	6.1 Shift the Miscellaneous header to the non-affected train using FNP-1-SOP-23.0, COMPONENT COOLING WATER SYSTEM Appendix B or Appendix C.	
__	**7 IF both seal injection and CCW are lost to the RCP's, THEN isolate the RCP seal cooling**	
	7.1 Verify CCW return from RCP thermal barrier valves CLOSED. CCW FROM RCP THRM BARR [ ] Q1P17HV3045 Closed [ ] Q1P17HV3184 Closed	7.1 Locally isolate CCW return [ ] Q1P17V107 - Closed (121 PPR)
	7.2 Isolate RCP seal return valves. RCP SEAL WTR RTN ISO [ ] Q1E21MOV8112 Closed [ ] Q1E21MOV8100 Closed	7.2 Locally isolate seal water return lines(139 ft. rad side filter room) [ ] SEAL WATER RTN FILTER INLET Q1E21V189A Closed [ ] SEAL WATER RTM FILTER BYPASS Q1E21V190 Closed

° Step 7 continued on next page

__Page Completed

Step	Action/Expected Response	Response Not Obtained

7.3 Isolate seal injection by closing seal water injection filter inlet valves. (139 ft. rad side filter room)

SEAL WATER INJ FILTER A INLET
[ ] Q1E21V127A - Closed
[ ] Q1E21V127C - Closed

SEAL WATER INJ FILTER B INLET
[ ] Q1E21V127B - Closed
[ ] Q1E21V127D - Closed

NOTE:
- IF it is believed the miscellaneous header will be restored, THEN step 8 actions may be performed as necessary to reduce loads as needed to isolate affected equipment.
- This is a continuing action step.

__ **8 Perform the following:**

8.1 Secure letdown

8.1.1 Have Chemistry secure the Zinc Addition System per FNP-1-CCP-335.

NOTE: In modes 4, 5, & 6 the following actions could affect low pressure letdown and solid plant pressure control.

8.1.2 Manually adjust low pressure letdown controller to 50%.

LP LTDN PRESS
[ ] PK 145 - 50%

° Step 8 continued on next page

__Page Completed

Step	Action/Expected Response	Response Not Obtained

8.1.3 Close Letdown Orifice isolation valves

LTDN ORIF ISO
45 GPM
[ ] Q1E21HV8149A Closed

LTDN ORIF ISO
60 GPM
[ ] Q1E21HV8149B Closed
[ ] Q1E21HV8149C Closed

8.2 Manually secure charging flow.

CHG FLOW
[ ] FK-122 Adjusted Closed

NOTE: Aligning charging pump suction to the RWST will result in borating the RCS.

8.3 Align charging pump suction to the RWST.

RWST
TO CHG PUMP
[ ] Q1E21LCV115B OPEN
[ ] Q1E21LCV115D OPEN

VCT
OUTLET ISO
[ ] Q1E21LCV115C CLOSED
[ ] Q1E21LCV115E CLOSED

° Step 8 continued on next page

__Page Completed

Step	Action/Expected Response	Response Not Obtained
8.4	Isolate RCP seal return RCP SEAL WTR RTN ISO [ ] Q1E21MOV8112 CLOSED [ ] Q1E21MOV8100 CLOSED	8.4 Locally isolate seal water return line.(139' filter room) [ ] SEAL WATER RTN FILTER INLET Q1E21V189A - CLOSED [ ] SEAL WATER RTM FILTER BYPASS Q1E21V190 - CLOSED
8.5	Verify excess letdown secured EXC LTDN ISO [ ] Q1E21HV8153 CLOSED [ ] Q1E21HV8154 CLOSED	
8.6	Verify RCDT not on recirculation.	
8.7	Verify waste gas system shutdown	
8.8	Inform Chemistry to secure any sampling.	

NOTE: Step 2 is a continuing action step and the RNO column has guidance for Charging and RHR pumps which may be applicable.

8.9	IF CCW leak is in the miscellaneous header AND cannot be isolated, , THEN isolate the Miscellaneous header as follows:	
8.9.1	IF the reactor is critical, THEN trip the reactor and perform, FNP-1-EEP-0, REACTOR TRIP OR SAFETY INJECTION, while continuing with this procedure.	
8.9.2	Verify all Reactor Coolant pumps stopped.	

° Step 8 continued on next page

UNIT 1

Step	Action/Expected Response	Response Not Obtained
	8.9.3 IF in Mode 3 or 4, THEN perform FNP-1-AOP-4.0, LOSS OF REACTOR COOLANT FLOW while continuing with procedure.	
	8.9.4 Isolate CCW to secondary heat exchangers. CCW TO SECONDARY HXS [ ] Q1P17MOV3047 - Closed	8.9.4 Manually isolate the Miscellaneous header by closing the following valves. (100' CCW HX Room) [ ] 1B CCW HX Outlet iso Q1P17V008B. [ ] CCW SUPP HDR XCON Q1P17V009B [ ] CCW SUPP HDR XCON Q1P17V009C
__	**9 Check both RHR pumps stopped**	9 IF CCW cooling to a running RHR pump is inadequate, THEN perform the following: 9.1 Stop the affected RHR pump. 9.2 IF in modes 5 or 6, THEN perform FNP-1-AOP-12.0, RESIDUAL HEAT REMOVAL SYSTEM MALFUNCTION, in conjunction with this procedure.
__	**10 Evaluate event classification and notification requirements using FNP-0-EIP-8, NON-EMERGENCY NOTIFICATIONS AND NMP-EP-110, EMERGENCY CLASSIFICATION DETERMINATION AND INITIAL ACTIONS.**	
__	**11 Check SFP cooling aligned to an operating CCW train.**	11 Align SFP cooling to non affected train using FNP-1-SOP-54.0, SPENT FUEL PIT COOLING AND PURIFICATION SYSTEM.

__Page Completed

Step	Action/Expected Response	Response Not Obtained
__	**12 Check on service CCW train operating.**	12 Determine actions required to restore an ON SERVICE Train.

NOTE: Control power should only be removed from components after checking the breaker OPEN.

__ **13 IF desired to defeat the Autostart capability of components cooled by CCW, THEN remove control power from the following:**

A Train
1A RHR Pump, Q1R15BKRDF09
1A Charging Pump, Q1R15BKRDF06
1B Charging Pump (A Trn), Q1R15BKRDF07

B Train
1B RHR Pump, Q1R15BKRDG09
1B Charging Pump, (B Trn) Q1R15BKRDG07
1C Charging Pump, Q1R15BKRDG06

__ **14 WHEN desired to restore the Autostart capability of components cooled by CCW, THEN restore control power to the following:**

A Train
1A RHR Pump, Q1R15BKRDF09
1A Charging Pump, Q1R15BKRDF06
1B Charging Pump (A Trn), Q1R15BKRDF07

B Train
1B RHR Pump, Q1R15BKRDG09
1B Charging Pump, (B Trn) Q1R15BKRDG07
1C Charging Pump, Q1R15BKRDG06

__ **15 Go to procedure and step in effect.**

-END-

__Page Completed

Step	Action/Expected Response	Response Not Obtained

ATTACHMENT 1

ESTABLISHING FIREWATER COOLING TO A CHARGING PUMP

****

CAUTION: RCP seal injection should be maintained, however, only one CHG PUMP can be allowed to suffer damage from operation without cooling water.

****

NOTE:
- The purpose of this attachment is to align the fire protection water system to replace CCW as the cooling water source for a CHG PUMP so that long term RCP seal injection and RCS makeup are available.
- It is expected that a CHG PUMP may be damaged while operating without cooling water during performance of this attachment. The operating CHG PUMP should be monitored closely for degradation.
- Until alternate cooling is established, swapping the operating CHG PUMP may lengthen the time that RCP seal injection is maintained.
- Performance of this attachment will contaminate (chemically) a portion of the CCW system. This contamination should be considered when the system is restored to normal alignment.

__ **1 Align charging pump suction to RWST.**

RWST
TO CHG PUMP

[ ] Q1E21LCV115B open
[ ] Q1E21LCV115D open

VCT
OUTLET ISO

[ ] Q1E21LCV115C closed
[ ] Q1E21LCV115E closed

__Page Completed

Step	Action/Expected Response	Response Not Obtained

ATTACHMENT 1

ESTABLISHING FIREWATER COOLING TO A CHARGING PUMP

__ **2 Isolate seal water return line.**

RCP SEAL WTR
RTN ISO
[ ] Q1E21MOV8112 - closed
[ ] Q1E21MOV8100 - closed

2 Locally isolate seal water return line. (139 ft, AUX BLDG rad side filter room)

SEAL WATER RTN
FLTR INLET
[ ] Q1E21V189A closed

SEAL WATER RTN
FLTR BYP VLV
[ ] Q1E21V190 closed

****

CAUTION: Isolation of CCW flow to the RCP thermal barrier and seal injection flow may result in RCP seal damage. These actions must not be performed prior to reaching the setpoint.

****

__ **3 Monitor RCP seals.**

NOTE:
- RCP number 1 seal outlet temperature can be obtained from computer points TE0132, TE0129 and TE0126.
- RCP SEAL WTR INJ ISO Q1E21MOV8105 is normally deenergized. The power supply for this valve is FE-G3.

3.1 WHEN any RCP number 1 seal outlet temperature is greater than 235°F, THEN isolate seal injection line.

RCP SEAL WTER
INJ ISO
[ ] Q1E21MOV8105 closed

3.1 Locally isolate seal injection line. (139 ft, AUX BLDG rad side filter room)

SEAL WATER INJ
FILTER A INLET
[ ] Q1E21V127A closed
[ ] Q1E21V127C closed

SEAL WATER INJ
FILTER B INLET
[ ] Q1E21V127B closed
[ ] Q1E21V127D closed

° Step 3 continued on next page

__Page Completed

Step	Action/Expected Response	Response Not Obtained

ATTACHMENT 1

ESTABLISHING FIREWATER COOLING TO A CHARGING PUMP

	3.2 WHEN CCW temperature greater than 130°F, THEN isolate CCW return from RCP thermal barrier. CCW FROM RCP THRM BARR [ ] Q1P17HV3045 closed [ ] Q1P17HV3184 closed	3.2 Locally isolate CCW return from RCP thermal barrier. (121 ft, AUX BLDG rad side PPR) CCW FROM RCP THRM BARR [ ] Q1P17V107 closed
__	**4 Begin cooldown to hot shutdown using FNP-1-ESP-0.2, NATURAL CIRCULATION COOLDOWN TO PREVENT REACTOR VESSEL STEAM HEAD VOIDING for guidance.**	
__	**5 Establish alternate cooling to one CHG PUMP.** [ ] 1A CHG PUMP go to step 6. [ ] 1B CHG PUMP go to step 7 (A Trn). [ ] 1B CHG PUMP go to step 8 (B Trn) [ ] 1C CHG PUMP go to step 9	

__Page Completed

Step	Action/Expected Response	Response Not Obtained

ATTACHMENT 1

ESTABLISHING FIREWATER COOLING TO A CHARGING PUMP

__ **6 Establish alternate cooling to 1A CHG PUMP.**

6.1 Isolate CCW to A Train charging pumps.(A train valves are in 100 ft, hallway outside the CHG PUMP area.)

[ ] Close Q1P17V290, A TRAIN CCW SUPPLY HDR TO CHG PUMPS ISO.

[ ] Close Q1P17V292, A TRAIN CCW RETURN HDR FROM CHG PUMPS

NOTE: The intent of the following step is to isolate CCW to the charging pump which will NOT be used (if two pumps are aligned to a single train), to ensure that all firewater cooling established will be directed to the running pump**.**

6.2 IF 1B CHG Pump aligned to A TRN, THEN isolate CCW to 1B CHG Pump. (100 ft, AUX BLDG CHG PUMP rooms)

[ ] Close Q1P17V0C1B, CCW to 1B CHG PUMP.

[ ] Close Q1P17V0C2B CCW FROM 1B CHG PUMP.

NOTE: **All materials needed to make temporary connections in the following steps are stored in Room 160 (Hatch Area) south hall near the scaffold storage area and in fire hose cabinet N1V43D110.**

6.3 Install fire hose from hose cabinet N1V43D110 (outside the charging pump hallway) to Q1P17V302, A TRAIN CCW SUPPLY HDR DRN, using a temporary adapter.

° Step 6 continued on next page

__Page Completed

Step	Action/Expected Response	Response Not Obtained

ATTACHMENT 1

ESTABLISHING FIREWATER COOLING TO A CHARGING PUMP

6.4 Install temporary drain hose from Q1P17V304, A TRAIN CCW RETURN HDR DRN to a floor drain.

6.5 Open supply valve Q1P17V302, A TRAIN CCW SUPPLY HDR DRN.

6.6 Open Q1P17V304, A TRAIN CCW RETURN HDR DRN.

6.7 Adjust hose cabinet isolation valve to establish 20-60 gpm flow to 1A CHG PUMP, FI-3322A.

6.8 Start 1A CHG PUMP.

6.9 Stop any other running CHG PUMP.

****

CAUTION: The CHG PUMP oil cooler may be damaged if cooling flow exceeds 140 gpm.

****

6.10 Control hose cabinet isolation valve to maintain 1A CHG PUMP oil temperature less than 160°F on TISH-3306AA.

6.11 Proceed to step 10

Step	Action/Expected Response	Response Not Obtained

ATTACHMENT 1

ESTABLISHING FIREWATER COOLING TO A CHARGING PUMP

__ **7 Establish alternate cooling to 1B CHG PUMP if aligned to A TRN.**

7.1 Isolate CCW to A train charging pumps. (A train valves are in 100 ft, hallway outside the CHG PUMP area)

[ ] Close Q1P17V290, A TRAIN CCW SUPPLY HDR TO CHG PUMPS ISO.

[ ] Close Q1P17V292, A TRAIN CCW RETURN HDR FROM CHG PUMPS ISO.

NOTE: The intent of the following step is to isolate CCW to the charging pump which will NOT be used (if two pumps are aligned to a single train), to ensure that all firewater cooling established will be directed to the running pump**.**

7.2 Isolate CCW to 1A CHG Pump. (100 ft, AUX BLDG CHG PUMP rooms)

[ ] Close Q1P17V0C1A, CCW to 1A CHG PUMP.

[ ] Close Q1P17V0C2A CCW FROM 1A CHG PUMP.

NOTE: **All materials needed to make temporary connections in the following steps are stored in Room 160 (Hatch Area) south hall near the scaffold storage area and in fire hose cabinet N1V43D110.**

7.3 Install fire hose from hose cabinet N1V43D110 (outside the charging pump hallway) to Q1P17V302, A TRAIN CCW SUPPLY HDR DRN, using a temporary adapter.

° Step 7 continued on next page

__Page Completed

Step	Action/Expected Response	Response Not Obtained

ATTACHMENT 1

ESTABLISHING FIREWATER COOLING TO A CHARGING PUMP

7.4 Install temporary drain hose from Q1P17V304, A TRAIN CCW RETURN HDR DRN to floor drain.

7.5 Open Q1P17V302, A TRAIN CCW SUPPLY HDR DRN.

7.6 Open, Q1P17V304, A TRAIN CCW RETURN HDR DRN.

7.7 Adjust hose cabinet isolation valve to establish 20-60 gpm flow to 1B CHG PUMP, FI-3322B.

7.8 Start 1B CHG PUMP.

7.9 Stop any other running CHG PUMP.

****

CAUTION: The CHG PUMP oil cooler may be damaged if cooling flow exceeds 140 gpm.

****

7.10 Control hose cabinet isolation valve to maintain 1B CHG PUMP oil temperature less than 160°F on TISH-3306BA.

7.11 Proceed to step 10

__Page Completed

Step	Action/Expected Response	Response Not Obtained

ATTACHMENT 1

ESTABLISHING FIREWATER COOLING TO A CHARGING PUMP

__ **8 Establish alternate cooling to1B CHG PUMP if aligned to B TRN.**

8.1 Isolate CCW to B Train charging pumps.(B train valves are in the CHG PUMP area.)

[ ] Close Q1P17V291, B TRAIN CCW SUPPLY HDR ISO.

[ ] Close Q1P17V293, B TRAIN CCW RETURN HDR ISO.

NOTE: The intent of the following step is to isolate CCW to the charging pump which will NOT be used (if two pumps are aligned to a single train), to ensure that all firewater cooling established will be directed to the running pump**.**

8.2 Isolate CCW to 1C CHG Pump. (100 ft, AUX BLDG CHG PUMP rooms)

[ ] Close Q1P17V0C1C, CCW to 1C CHG PUMP.

[ ] Close Q1P17V0C2C CCW FROM 1C CHG PUMP.

NOTE: **All materials needed to make temporary connections in the following steps are stored in Room 160 (Hatch Area) south hall near the scaffold storage area and in fire hose cabinet N1V43D110.**

8.3 Install fire hose from hose cabinet N1V43D110 (outside the charging pump hallway) to Q1P17V303, B TRAIN CCW SUPPLY HDR DRN using a temporary adapter.

° Step 8 continued on next page

__Page Completed

Step	Action/Expected Response	Response Not Obtained

ATTACHMENT 1

ESTABLISHING FIREWATER COOLING TO A CHARGING PUMP

8.4 Install temporary drain hose from Q1P17V305, B TRAIN CCW RETURN HDR DRN to floor drain

8.5 Open Q1P17V303, B TRAIN CCW SUPPLY HDR DRN.

8.6 Open Q1P17V305, B TRAIN CCW RETURN HDR DRN.

8.7 Adjust hose cabinet isolation valve to establish 20-60 gpm flow to 1B CHG PUMP on FI-3322B.

8.8 Start 1B CHG PUMP.

8.9 Stop any other running CHG PUMP.

****

CAUTION: The CHG PUMP oil cooler may be damaged if cooling flow exceeds 140 gpm.

****

8.10 Control hose cabinet isolation valve to maintain 1B CHG PUMP oil temperature less than 160°F on TISH-3306BA

8.11 Proceed to step 10

Step	Action/Expected Response	Response Not Obtained

ATTACHMENT 1

ESTABLISHING FIREWATER COOLING TO A CHARGING PUMP

__ **9 Establish alternate cooling to 1C CHG PUMP.**

9.1 Isolate CCW to B train. (B train valves are in the CHG PUMP area.)

[ ] Close Q1P17V291, B TRAIN CCW SUPPLY HDR ISO.

[ ] Close Q1P17V293, B TRAIN CCW RETURN HDR ISO.

NOTE: The intent of the following step is to isolate CCW to the charging pump which will NOT be used (if two pumps are aligned to a single train), to ensure that all firewater cooling established will be directed to the running pump**.**

9.2 IF 1B CHG Pump aligned to B TRN, THEN isolate CCW to 1B CHG Pump. (100 ft, AUX BLDG CHG PUMP rooms)

[ ] Close Q1P17V0C1B, CCW to 1B CHG PUMP.

[ ] Close Q1P17V0C2B CCW FROM 1B CHG PUMP

NOTE: **All materials needed to make temporary connections in the following steps are stored in Room 160 (Hatch Area) south hall near the scaffold storage area and in fire hose cabinet N1V43D110.**

9.3 Install fire hose from hose cabinet N1V43D110 (outside the charging pump hallway) to Q1P17V303, B TRAIN CCW SUPPLY HDR DRN using a temporary adapter.

° Step 9 continued on next page

__Page Completed

Step	Action/Expected Response	Response Not Obtained

ATTACHMENT 1

ESTABLISHING FIREWATER COOLING TO A CHARGING PUMP

9.4 Install temporary drain hose from Q1P17V305, B TRAIN CCW RETURN HDR DRN to floor drain.

9.5 Open Q1P17V303, B TRAIN CCW SUPPLY HDR DRN.

9.6 Open Q1P17V305, B TRAIN CCW RETURN HDR DRN.

9.7 Adjust hose cabinet isolation valve to establish 20-60 gpm flow to 1C CHG PUMP on FI-3322C.

9.8 Start 1C CHG PUMP.

9.9 Stop any other running CHG PUMP.

****

CAUTION: The CHG PUMP oil cooler may be damaged if cooling flow exceeds 140 gpm.

****

9.10 Control hose cabinet isolation valve to maintain 1C CHG PUMP oil temperature less than 160°F on TISH-3306CA.

****

CAUTION: To prevent potential seal damage, neither seal injection nor CCW cooling should be restored to RCPs which have lost both seal injection and CCW cooling.

****

__ **10 IF seal injection has been isolated, THEN consult TSC staff to evaluate restoring seal injection.**

__Page Completed

Step	Action/Expected Response	Response Not Obtained

ATTACHMENT 1

ESTABLISHING FIREWATER COOLING TO A CHARGING PUMP

__ **11 Consult TSC staff to evaluate long term plant status.**

__ **12 Notify control room of RCP seal cooling status.**

° -END-

__Page Completed

Step	Action/Expected Response	Response Not Obtained

ATTACHMENT 2

PLACING 1B CCW PUMP ON A TRAIN

NOTE: This attachment assumes a possible piping break on B train which could jeopardize the A train during the train swap. The 1B CCW pump and HX will be isolated prior to aligning a flow path on the A train.

__ **1 Check 1C CCW pump is available.**

1 Align 1B CCW pump to A train electrically using ATTACHMENT 4, PLACING 1B CCW PUMP ON A TRAIN ELECTRICALLY while continuing with this ATTACHMENT.

__ **2 Verify 1B CCW Pump OFF.**

NOTE: The following step is to prevent lifting a CCW relief when the miscellaneous header is isolated.

__ **3 <u>IF</u> the 1A CCW pump is running, <u>THEN</u> align CCW to 1B RHR heat exchanger.**

CCW TO
1B RHR HX
[ ] Q1P17MOV3185B - OPEN

__ **4 Close CCW pump suction xcon valve. (100' Aux Bldg non-rad, CCW Hx Room)**

[ ] Q1P17V110C - CLOSED

__ **5 Close CCW pump discharge header cross connect. (100' Aux Bldg non-rad, CCW Hx Room)**

[ ] Q1P17V003B - CLOSED

__Page Completed

Step	Action/Expected Response	Response Not Obtained

ATTACHMENT 2

PLACING 1B CCW PUMP ON A TRAIN

__ **6 Verify CLOSED 1B CCW HX outlet valve. (100' Aux Bldg non-rad, CCW Hx Room)**

[ ] Q1P17V008B - CLOSED

__ **7 Close CCW supply header xcon. (100' Aux Bldg non-rad, CCW Hx Room)**

[ ] Q1P17V009B -CLOSED

****

CAUTION: Monitor CCW surge tank level closely during the following step. Be prepared to add makeup.

****

__ **8 Open the following CCW supply header cross connects: (100' Aux Bldg non-rad, CCW Hx Room)**

[ ] Q1P17V009C - OPEN
[ ] Q1P17V009D - OPEN

__ **9 Open the following CCW pump discharge header cross connects: (100' Aux Bldg non-rad, CCW Hx Room)**

[ ] Q1P17V003C - OPEN
[ ] Q1P17V003D - OPEN

__ **10 Open the following CCW suction header cross connects: (100' Aux Bldg non-rad, CCW Hx Room)**

[ ] Q1P17V110D - OPEN
[ ] Q1P17V110E - OPEN

__ **11 Verify OPEN 1C CCW HX outlet valve. (100' Aux Bldg non-rad, CCW Hx Room)**

[ ] QIP17V008C - OPEN

__Page Completed

Step	Action/Expected Response	Response Not Obtained

ATTACHMENT 2

PLACING 1B CCW PUMP ON A TRAIN

__ **12 Establish Miscellaneous header CCW flow.**

12.1 Verify A train SW from 1C CCW heat exchanger in MOD

SW FROM
1C CCW HX
[ ] Q1P16FV3009C in MOD

12.2 Throttle 1C CCW heat exchanger SW discharge flow controller to control CCW temperature.

1C CCW HX
DISCH FCV
HIC
[ ] 3009C -ADJUSTED

12.3 Verify OPEN CCW to 1A RHR heat exchanger.

CCW TO
1A RHR HX
[ ] Q1P17MOV3185A - OPEN

12.4 Verify 1C CCW Pump started

12.4 WHEN 1B CCW Pump electrically aligned to A train per ATTACHMENT 4, PLACING 1B CCW PUMP ON A TRAIN ELECTRICALLY,
THEN start 1B CCW Pump.

__ **13 Close CCW suction header cross connect. (100' Aux Bldg non-rad, CCW Hx Room)**

[ ] Q1P17V110B - CLOSED

__Page Completed

Step	Action/Expected Response	Response Not Obtained

ATTACHMENT 2

PLACING 1B CCW PUMP ON A TRAIN

__ **14 Close CCW discharge header cross connect. (100' Aux Bldg non-rad, CCW Hx Room)**

[ ] Q1P17V003A - CLOSED

__ **15 Close B TRAIN CCW supply header xcon. (100' Aux Bldg non-rad, CCW Hx Room)**

[ ] Q1P17V009A - CLOSED

__ **16 Close the following 1B CCW HX B TRN SW inlet header isolation valves: (100' Aux Bldg non-rad, CCW Hx Room)**

[ ] Q1P16V002A - CLOSED
[ ] Q1P16V002B - CLOSED

__ **17 Close the following 1B CCW HX B TRN SW return header isolation valves: (100' Aux Bldg non-rad, CCW Hx Room)**

[ ] Q1P16V008B - CLOSED
[ ] Q1P16V008C - CLOSED

__ **18 Open 1B CCW HX A TRN SW return header isolation valves: (100' Aux Bldg non-rad, CCW Hx Room)**

[ ] Q1P16V008D - OPEN
[ ] Q1P16V008E - OPEN

__ **19 Open 1B CCW HX A TRN SW inlet header isolation valves: (100' Aux Bldg non-rad, CCW Hx Room)**

[ ] Q1P16V002C - OPEN
[ ] Q1P16V002D - OPEN

__ **20 Return in this procedure to step in effect.**

° -END-

__Page Completed

Step	Action/Expected Response	Response Not Obtained

ATTACHMENT 3

PLACING 1B CCW PUMP ON B TRAIN

NOTE: This attachment assumes a possible piping break on A train which could jeopardize the B train during the train swap. The 1B CCW pump and HX will be isolated prior to aligning a flow path on the B train.

__ **1 Check 1A CCW pump is available.**

1 Align 1 B CCW pump to B train electrically using ATTACHMENT 5, PLACING 1B CCW PUMP ON B TRAIN ELECTRICALLY while continuing with this ATTACHMENT.

__ **2 Verify 1B CCW Pump OFF.**

NOTE: The following step is to prevent lifting a CCW relief when the miscellaneous header is isolated.

__ **3 IF the 1C CCW pump is running, THEN align CCW to 1A RHR heat exchanger.**

CCW TO
1A RHR HX
[ ] Q1P17MOV3185A - OPEN

__ **4 Close CCW suction header cross connect (100' Aux Bldg non-rad, CCW Hx Room)**

[ ] Q1P17V110D - CLOSED

__ **5 Close CCW pump discharge header cross connects: (100' Aux Bldg non-rad, CCW Hx Room)**

[ ] Q1P17V003C - CLOSED

Step	Action/Expected Response	Response Not Obtained

ATTACHMENT 3

PLACING 1B CCW PUMP ON B TRAIN

__ **6 Verify closed 1B CCW HX outlet valve. (100' Aux Bldg non-rad, CCW Hx Room)**

[ ] Q1P17V008B - CLOSED

__ **7 Close the CCW supply header cross connect. (100' Aux Bldg non-rad, CCW Hx Room)**

[ ] Q1P17V009C - CLOSED

****

CAUTION: Monitor CCW surge tank level closely during the following step. Be prepared to add makeup.

****

__ **8 Open the CCW supply header cross connects. (100' Aux Bldg non-rad, CCW Hx Room)**

[ ] Q1P17V009A - OPEN
[ ] Q1P17V009B - OPEN

__ **9 Open CCW pump discharge header cross connects: (100' Aux Bldg non-rad, CCW Hx Room)**

[ ] Q1P17V003A - OPEN
[ ] Q1P17V003B - OPEN

__ **10 Open CCW suction header cross connects: (100' Aux Bldg non-rad, CCW Hx Room)**

[ ] Q1P17V110B - OPEN
[ ] Q1P17V110C - OPEN

__ **11 Verify OPEN 1A CCW HX outlet valve (100' Aux Bldg non-rad, CCW Hx Room)**

[ ] Q1P17V008A - OPEN

Step	Action/Expected Response	Response Not Obtained

ATTACHMENT 3

PLACING 1B CCW PUMP ON B TRAIN

__ **12 Establish Miscellaneous header CCW flow.**

12.1 Verify the B train SW from 1A CCW heat exchanger in MOD.

SW FROM
1A CCW HX
[ ] Q1P16FV3009A in MOD

12.2 Throttle 1A CCW heat exchanger SW discharge flow controller as necessary to control CCW temperature.

1A CCW HX
DISCH FCV
HIC
[ ] 3009A - ADJUSTED

12.3 Verify OPEN CCW to 1B RHR heat exchanger.

CCW TO
1B RHR HX
[ ] Q1P17MOV3185B - OPEN

12.4 Verify 1A CCW Pump started

12.4 WHEN 1B CCW Pump electrically aligned to B train per ATTACHMENT 5, PLACING 1B CCW PUMP ON B TRAIN ELECTRICALLY,
THEN start 1B CCW Pump.

__ **13 Close CCW suction header cross connect valve. (100' Aux Bldg non-rad, CCW Hx Room)**

[ ] Q1P17V110E - CLOSED

Step	Action/Expected Response	Response Not Obtained

ATTACHMENT 3

PLACING 1B CCW PUMP ON B TRAIN

__ **14 Close CCW Pump discharge header cross connects. (100' Aux Bldg non-rad, CCW Hx Room)**

[ ] Q1P17V003D - CLOSED

__ **15 Close CCW supply header cross connect. (100' Aux Bldg non-rad, CCW Hx Room)**

[ ] Q1P17V009D - CLOSED

__ **16 Close the following 1B CCW HX A TRN SW inlet header isolation valves: (100' Aux Bldg non-rad, CCW Hx Room)**

[ ] Q1P16V002D - CLOSED
[ ] Q1P16V002C - CLOSED

__ **17 Close the following 1B CCW HX A TRN SW inlet header isolation valves: (100' Aux Bldg non-rad, CCW Hx Room)**

[ ] Q1P16V008E - CLOSED
[ ] Q1P16V008D - CLOSED

__ **18 Open the following 1B CCW HX B TRN SW inlet header isolation valves: (100' Aux Bldg non-rad, CCW Hx Room)**

[ ] Q1P16V002A - OPEN
[ ] Q1P16V002B - OPEN

__ **19 Open the following 1B CCW HX B TRN SW return header isolation valves. (100' Aux Bldg non-rad, CCW Hx Room)**

[ ] Q1P16V008B - OPEN
[ ] Q1P16V008C - OPEN

__ **20 Return in this procedure to step in affect.**

° -END-

Step	Action/Expected Response	Response Not Obtained

ATTACHMENT 4

PLACING 1B CCW PUMP ON A TRAIN ELECTRICALLY

__ **1 Verify 1B CCW pump OFF.**

****

CAUTION: Breaker DG-05-1 has alternate DC control power supplied through fuses in HSP-C when 1B CCW PUMP LOCAL-REMOTE switch on HSP-C is in LOCAL.

****

__ **2 Verify LOCAL-REMOTE switch on the HSP-C for 1B CCW PUMP in REMOTE.**

__ **3 Rack out Breaker DG05-1.**

__ **4 Verify breaker DG05-1 racked out, AND turn key #RE-14291 in the mechanical interlock and remove it.**

__ **5 Insert key #RE-14291 into mechanical interlock on 1B CCW pump 4KV disconnect switch 1B (Q1R18A004B-B) and turn it. Key #RE-14291 is now held in place.**

__ **6 Open 1B disconnect switch, AND verify the position indicator reads SW open.**

__ **7 On disconnect 1B turn key #RE-14224 in its mechanical and remove it. 1B disconnect is now locked open.**

__ **8 On 1B CCW pump 4KV disconnect switch 1A (Q1R18A004A-A) insert key #RE-14224 into its mechanical interlock and turn it. Key #RE-14224 is now held in place.**

__ **9 Close 1A disconnect switch, AND verify the position indicator reads SW closed.**

Step	Action/Expected Response	Response Not Obtained

ATTACHMENT 4

PLACING 1B CCW PUMP ON A TRAIN ELECTRICALLY

__ **10** **On 1A disconnect switch turn key #RE-14625 in the mechanical interlock and remove it. 1A disconnect switch is now locked in the closed position.**

__ **11** **Insert key #RE-14625 into the mechanical interlock on breaker DF05-1 and turn it. Key #RE-14625 is now held in place.**

__ **12** **Rack in breaker DF05-1 to the connect position.**

__ **13** **Close DC control power for Breaker DF05-1 AND verify breaker spring charges.**

__ **14** **Verify closed breaker Q1R17BKRFAI4, supply for 1A RM CLR FAN CCW Pump Area.**

__ **15** **Report to the Control Room that the 1B CCW Pump A train electrical line up is complete.**

° -END-

Step	Action/Expected Response	Response Not Obtained

ATTACHMENT 5

PLACING 1B CCW PUMP ON B TRAIN ELECTRICALLY

__ **1** **Verify 1B CCW Pump off**

__ **2** **Rack out breaker DF05-1**

__ **3** **Verify breaker DF05-1 is racked out, AND turn key #RE-14265 in the mechanical interlock on breaker DF05-1 and remove it.**

__ **4** **Insert key #RE-14265 into the mechanical interlock on 1B CCW pump 4KV disconnect Switch 1A (Q1R18A004A-A) and turn it. Key #RE-14265 is now held in place.**

__ **5** **Open 1A disconnect switch and verify the position indicator reads SW open.**

__ **6** **Turn key #RE-14224 in its mechanical interlock on disconnect 1A and remove it. 1A disconnect switch is now locked in the open position.**

__ **7** **Insert key #RE-14224 into its mechanical interlock on 1B CCW pump 4KV disconnect switch 1B (Q1R18A004B-B) and turn it. Key #RE-14224 is now held in place.**

__ **8** **Close 1B disconnect switch. Verify the position indicator reads SW closed.**

__ **9** **Turn key #RE-14291 in its mechanical interlock and remove it. 1B disconnect switch is now locked in the closed position.**

Step	Action/Expected Response	Response Not Obtained

ATTACHMENT 5

PLACING 1B CCW PUMP ON B TRAIN ELECTRICALLY

****

CAUTION: Breaker DG05-1 has alternate DC control power supplied through fuses in HSP-C when 1B CCW LOCAL-REMOTE switch on HSP-C is in local

****

__ **10 Verify LOCAL-REMOTE switch on HSP-C for 1B CCW PUMP in REMOTE.**

__ **11 Insert key #RE-14291 into it mechanical interlock on circuit breaker DG05-1 and turn key. Key #RE-14291 is now held in place.**

__ **12 Rack breaker DG05-1 to the connect position.**

__ **13 Close DC control power for Breaker DG05-1 AND verify breaker spring charges.**

__ **14 Verify closed breaker Q1R17BKRFBD4 (1B RM CLR FAN CCW Pump Area)**

__ **15 Report to the Control Room that the B train Electrical line up for B CCW pump complete.**

° -END-

FARLEY NUCLEAR PLANT

ABNORMAL OPERATING PROCEDURE

FNP-1-AOP-4.0

SAFETY RELATED

LOSS OF REACTOR COOLANT FLOW

PROCEDURE USAGE REQUIREMENTS PER FNP-0-AP-6	SECTIONS
Continuous Use	Remainder of Procedure
Reference Use	Steps 1 - 2.1
Information Use	

Approved:

Wade Warren (for)
Operations Manager

Date Issued: February 24, 2010

UNIT 1

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A. **Purpose**

This procedure provides actions for response to a loss of forced RCS flow in one or more loops when a reactor trip is not required. In order to prevent a possible reactor power excursion, NO RCP should be restarted while the reactor is critical.

This procedure is applicable in Modes 1, 2, 3 and 4.

B. Symptoms or Entry Conditions

I. This procedure is entered when forced RCS flow is lost in one or more loops and no reactor trip is required.

C Automatic Actions

1 Loss of flow in one loop with reactor power greater than 30% will cause a reactor trip.

2 Loss of flow in two loops with reactor or turbine power greater than 10% will cause a reactor trip.

D Operational Concerns

1 SG level in any affected loop will tend to shrink.

2 Thermal shock to the spray nozzle will occur if auxiliary spray is initiated without normal letdown in service.

3 The PRT may rupture causing abnormal containment conditions while using PRZR PORVs for pressurizer pressure control.

4 To prevent heat exchanger damage, do not attempt restoration of letdown or excess letdown unless the CCW miscellaneous header is aligned to an operating loop.

5 In order to prevent a possible reactor power excursion, NO RCP should be restarted while the reactor is critical.

6 IF 1B RCP is NOT running, THEN 1A & 1C RCPs are required to provide adequate spray flow through the 1A RCS loop spray valve.

Step	Action/Expected Response	Response Not Obtained

NOTE: Steps 1 through 2.1 are IMMEDIATE OPERATOR actions.

__ **1 Check 1A and 1B RCPs - RUNNING.**

1 Manually close pressurizer spray valve for affected RCP.

[ ] 1A RCS loop spray valve PK-444C
[ ] 1B RCS loop spray valve PK-444D

__ **2 [CA] Maintain SG narrow range level stable at approximately 65% using:**

[ ] Main Feedwater Regulating Valves
[ ] Main Feedwater Bypass Regulating Valves.
[ ] Auxiliary Feedwater Control Valves.

2 IF SG level rise cannot be controlled, THEN perform the following:

2.1 IF main feedwater in service, THEN close the affected SG Main Feedwater Stop Valve(s)

[ ] 1A SG Q1N21MOV3232A
[ ] 1B SG Q1N21MOV3232B
[ ] 1C SG Q1N21MOV3232C

2.2 IF auxiliary feedwater in service, THEN close the affected SG AFW Stop Valve(s)

[ ] 1A SG Q1N23MOV3350A
[ ] 1B SG Q1N23MOV3350B
[ ] 1C SG Q1N23MOV3350C

__ **3 [CA] Monitor Tavg for all three RCS loops ≥ 541°F. (TS 3.4.2)**

3 Perform the following..

3.1 IF the main generator is ON LINE, THEN trip the reactor and go to FNP-1-EEP-0, REACTOR TRIP OR SAFETY INJECTION

3.2 IF the main generator is OFF LINE, THEN raise Tavg ≥ 541°F within 30 minutes

3.2.1 Adjust steam dumps to reduce secondary power demand as necessary

° Step 3 continued on next page

__Page Completed

Step	Action/Expected Response	Response Not Obtained
		3.2.2 Verify rod control in MANUAL
		3.2.3 Stabilize Tavg in the idle loop(s) > 541°F while maintaining the running loop(s) < 554°F by adjusting rod position and/or boron concentration
		3.2.4 IF unable to restore Tavg ≥ 541°F, THEN trip the reactor and go to FNP-1-EEP-0, REACTOR TRIP OR SAFETY INJECTION
__	**4 [CA] Maintain PRZR pressure 2200-2300 psig.**	
	4.1 Control PRZR heaters as required.	
	4.2 IF 1A and 1B RCPs running, THEN, control pressurizer pressure with both normal spray valves.	4.2 Perform the following
		4.2.1 IF 1B RCP running, THEN control pressurizer pressure with PK-444D.

NOTE: Running 1A and 1C RCPs will be required to provide adequate spray flow through the 1A RCS loop spray valve.

		4.2.2 IF 1A & 1C RCPs are running, THEN control pressurizer pressure with PK-444C.
		4.2.3 IF spray flow is adequate, THEN proceed to step 5.
		4.2.4 IF no spray valves are available, THEN proceed to step 4.4.
	4.3 Proceed to step 5.	

° Step 4 continued on next page

__Page Completed

Step	Action/Expected Response	Response Not Obtained

****

CAUTION: To prevent PRZR PORV failure, cycling of PRZR PORVs should be minimized.

****

4.4 IF normal spray valves are not available AND letdown is on service, THEN establish auxiliary spray.

4.4 Perform the following:

4.4.1 Open RCS loop spray valves

[ ] PK 444C manually open
[ ] PK 444D manually open

4.4.2 Close RCS NORMAL CHG LINE

[ ] Q1E21HV8146 closed

4.4.3 Close RCS ALT CHG LINE

[ ] Q1E21HV8147 closed

4.4.4 Open RCS PRZR AUX SPRAY

[ ] Q1E21HV8145 open

a) WHEN needed for immediate pressure control, THEN control pressurizer pressure with PRZR PORV.

1) Open only one PRZR PORV for any RCS pressure reduction.

2) Maintain PRT parameters normal using FNP-1-SOP-1.2, REACTOR COOLANT PRESSURE RELIEF SYSTEM

3) IF any PRZR PORV fails to recluse, THEN close associated PRZR PORV ISO.

b) Proceed to step 5 Response Not Obtained Column AND establish normal letdown.

° Step 4 continued on next page

__Page Completed

Step	Action/Expected Response	Response Not Obtained

NOTE: Changes in charging flow will cause PRZR pressure fluctuations when auxiliary spray is established.

4.4.5 Operate the following valves as required:

[ ] CHG FLOW FK-122 manually adjusted as required to control pressure

[ ] 1A LOOP SPRAY VLV PK-444C manually open/closed

[ ] 1B LOOP SPRAY VLV PK-444D manually open/closed

[ ] RCS PRZR AUX SPRAY Q1E21HV8145 open/closed

[ ] RCS NORMAL CHG LINE Q1E21HV8146 open/closed

[ ] RCS ALT CHG LINE Q1E21HV8147 open/closed

4.4.6 Proceed to Step 6.

__ **5 Check normal letdown - ESTABLISHED.** 5 Perform the following:

****

CAUTION: CCW to the miscellaneous header is required to prevent damage to the letdown heat exchanger.

****

5.1 Verify the CCW miscellaneous header is aligned to an operating CCW loop.

° Step 5 continued on next page

__Page Completed

Step	Action/Expected Response	Response Not Obtained
		5.2 IF letdown has isolated due to a plant transient, THEN establish normal letdown using ATTACHMENT 1, RESTORING LETDOWN. 5.3 IF a letdown isolated due to a system malfunction, THEN perform the following: [ ] Attempt to restore any letdown flow using FNP-1-AOP-16.0, CVCS MALFUNCTION. [ ] Continue with applicable steps of this procedure. 5.4 WHEN normal letdown restored AND IF required, THEN return to step 4.4 to establish auxiliary spray.
__	**6 [CA] Maintain PRZR level at approximately 22%.**	

__Page Completed

Step	Action/Expected Response	Response Not Obtained

NOTE: In Mode 3 with reactor trip breakers closed AND rod control enabled, loss of two RCP busses requires actions to restart RCP(s) or de-energize all CRDMs within 1 hour per Tech Spec 3.4.5, Condition C.

__ **7 Within six hours of the loss of RCS flow complete the following:**

7.1 IF the unit is in Mode 1 or 2, THEN place unit in Mode 3 using the following procedures:

[ ] FNP-1-UOP-3.1, POWER OPERATION

[ ] FNP-1-UOP-2.1, SHUTDOWN OF UNIT FROM MINIMUM LOAD TO HOT STANDBY

7.2 WHEN unit in Mode 3 or 4, THEN verify all reactor trip and reactor trip bypass breakers open.

[ ] Reactor Trip Breaker A
[ ] Reactor Trip Breaker B
[ ] Reactor Trip Bypass Breaker A
[ ] Reactor Trip Bypass Breaker B

7.2 Secure both CRDM MG sets using FNP-1-SOP-41.0, CONTROL ROD DRIVE AND POSITION INDICATION SYSTEM.

NOTE: Step 7 must be complete before continuing with this procedure.

__ **8 Check at least one RCP - RUNNING.**

8 Perform the following.

8.1 Secure any dilution in progress.

8.2 Start one RCP using FNP-1-SOP-1.1, REACTOR COOLANT SYSTEM.

° Step 8 continued on next page

__Page Completed

Step	Action/Expected Response	Response Not Obtained
		8.3 WHEN at least one RCP running, THEN go to FNP-1-UOP-2.1, SHUTDOWN OF UNIT FROM MINIMUM LOAD TO HOT STANDBY. 8.4 IF no RCP can be established running, THEN proceed to step 10.
__	**9 Go To FNP-1-UOP-2.1, SHUTDOWN OF UNIT FROM MINIMUM LOAD TO HOT STANDBY**	

NOTE:
- During natural circulation, loop transit time will be on the order of 10 minutes. Temperature trends will be of more value than actual temperatures
- As natural circulation develops, RCS ΔT should stabilize at less than 65°F. This will take 20 to 30 minutes
- Changes in SG feeding or steaming rates must be made slowly to prevent rapid RCS pressure changes.

__ **10 Verify adequate natural circulation.**

10.1 Check SG pressures stable or falling.

10.2 Check SUB COOLED MARGIN MONITOR indication greater than 16°F subcooled in CETC mode.

10.3 Check RCS hot leg temperatures stable or falling.

RCS HOT LEG TEMP
[ ] TR 413

10.4 Check core exit T/Cs stable or falling.

10.5 IF natural circulation NOT adequate, THEN dump steam at a faster rate.

° Step 10 continued on next page

__Page Completed

Step	Action/Expected Response	Response Not Obtained

10.6 Begin taking natural circulation logs.

****

CAUTION: During natural circulation with low decay heat loads, overfeeding the SGs will result in excessive cooldown with no apparent rise in SG level.

****

__ **11 [CA] Maintain SG narrow range levels at approximately 65%.**

- Control MDAFWP flow.

MDAFWP TO 1A(1B,1C) SG FLOW CONT
[ ] HIC 3227AA adjusted
[ ] HIC 3227BA adjusted
[ ] HIC 3227CA adjusted

- Control TDAFWP flow.

TDAFWP TO 1A(1B,1C) SG FLOW CONT
[ ] HIC 3228AA adjusted
[ ] HIC 3228BA adjusted
[ ] HIC 3228CA adjusted

__ **12 [CA] Monitor CST level.**

12.1	LI-4005 remains in the normal operating band 32-39'.	12.1 Contact Chemistry to maximize make up to the CST.
12.2	LI-4005 indicates >26 ft LI-4132A indicates >11 ft LI-4132B indicates >11 ft	12.2 IF adequate make up can NOT be established, THEN notify the Shift Manager and consideration should be given to reducing SGBD flow.
12.3	LI-4005 indicates >5.3 ft LI-4132A indicates >5.3 ft LI-4132B indicates >5.3 ft	12.3 IF CST level less than 5.3 ft, THEN align AFW pump suction to SW using FNP-1-SOP-22.0, AUXILIARY FEEDWATER SYSTEM.

__Page Completed

Step	Action/Expected Response	Response Not Obtained
__	**13 Verify reactor makeup system aligned.** 13.1 Verify BORIC ACID MKUP FLOW FK 113 - ADJUSTED TO DELIVER GREATER THAN EXISTING RCS BORON CONCENTRATION. 13.2 Verify reactor makeup system - IN AUTOMATIC MODE. MKUP MODE SEL SWITCH [ ] N1E21HS2100Q in AUTO MKUP MODE CONT SWITCH [ ] N1E21HS2100P to START	13 Manually control reactor makeup system using FNP-1-SOP-2.3, CHEMICAL AND VOLUME CONTROL SYSTEM REACTOR MAKEUP CONTROL SYSTEM.
__	**14 [CA] Maintain shutdown margin adequate.** 14.1 Direct Chemistry to sample RCS for boron concentration using FNP-1-CCP-651, SAMPLING THE REACTOR COOLANT SYSTEM at least once per two hours.	

° Step 14 continued on next page

__Page Completed

Step	Action/Expected Response	Response Not Obtained

NOTE: Natural circulation may cause inadequate RCS mixing. Any boration should be at a continuous rate not exceeding 65 gpm.

14.2 Verify shutdown margin using:

[ ] FNP-1-STP-29.1, SHUTDOWN MARGIN CALCULATION (TAVG 547°F)

OR

[ ] FNP-1-STP-29.2, SHUTDOWN MARGIN CALCULATION (TAVG < 547 °F OR BEFORE THE INITIAL CRITICALITY FOLLOWING REFUELING).

14.2 Borate RCS using FNP-1-AOP-27.0, EMERGENCY BORATION.

14.3 Monitor source range count rate stable or falling.

14.3 Borate RCS using FNP-1-AOP-27.0, EMERGENCY BORATION.

__ **15 [CA] Maintain hot standby conditions.**

- Maintain steam header pressure less than or equal to 1005 psig.
- Maintain average core exit T/C temperature less than 600°F.

__ **16 IF RCS cooldown NOT required, THEN return to step 8.**

16 Go to FNP-1-ESP-0.2, NATURAL CIRCULATION COOLDOWN TO PREVENT REACTOR VESSEL STEAM HEAD VOIDING to initiate RCS cooldown.

° -END-

__Page Completed

UNIT 1

ATTACHMENT 1

RESTORING LETDOWN

NOTE: This attachment assumes that letdown was lost due to a plant transient and that no system malfunction has occurred.

__ **1 [CA] <u>WHEN</u> plant conditions permit,**
<u>THEN</u> restore normal letdown flow as follows:

1.1 Verify closed all letdown orifice isolation valves.

LTDN ORIF ISO
45 GPM
[ ] Q1E21HV8149A

LTDN ORIF ISO
60 GPM
[ ] Q1E21HV8149B
[ ] Q1E21HV8149C

1.2 Verify LP LTDN PRESS PK 145 in MANUAL and adjust the demand signal to 50% or less.

1.3 Verify that LTDN HX OUTLET TEMP TK 144 is in AUTO, and set at 3.3 to maintain temperature at approximately 100 °F.

1.4 Verify that the VCT HI LVL DIVERT VLV LCV-115A position indicator VCT light is lit and the handswitch is in the AUTO position.

1.5 Verify that LTDN HI TEMP DIVERT VLV Q1E21TCV143, DEMIN light is lit and the handswitch is in the AUTO position.

1.6 <u>IF</u> necessary, ,
<u>THEN</u> OPEN both LTDN LINE PENE RM ISO's Q1E21HV8175A and B from the Penetration Room Isolation Panel.

1.7 Verify open LTDN LINE CTMT ISO Q1E21HV8152

1.8 Verify open both LTDN LINE ISO Q1E21LCV459 and Q1E21LCV460.

1.9 Verify CHG FLOW FK 122 is in MAN <u>AND</u> establish the required minimum charging flow for the number of orifices to be placed on service. (18 gpm for 1 orifice or 40 gpm for two orifices)

1.10 OPEN LTDN ORIF ISO 60 GPM Q1E21HV8149B or C to establish approximately 60 gpm Letdown flow.

° Step 1 continued on next page

UNIT 1

ATTACHMENT 1

RESTORING LETDOWN

1.11 Verify that LP LTDN PRESS PK 145 is set between 4.3-7.5 to maintain the desired Letdown Pressure between 260-450 psig.

1.12 IF necessary,
THEN adjust LP LTDN PRESS PK 145 in MANUAL to stabilize Letdown Pressure at the desired value.

1.13 Place LP LTDN PRESS PK 145 in AUTO and verify that Letdown pressure is maintained at the desired value.

1.14 Verify that LTDN HX OUTLET TEMP TK 144 is maintaining Letdown temperature at approximately 100 °F.

[ ] TI-116 VCT TEMP
[ ] TI-143 DIVERT LTDN HX TEMP
[ ] TI-144 CCW LTDN HX TEMP

1.15 IF normal letdown flow NOT established,
THEN attempt to restore any letdown flow using FNP-1-AOP-16.0, CVCS MALFUNCTION.

° -END-

jpm g
CRO-033 MOD

TITLE: Perform Section 4.9 of STP-5.0, Full Length Control Rod Operability Test

PROGRAM APPLICABLE: SOIT ___ SOCT ___ HLT __X__ LOCT ___

ACCEPTABLE EVALUATION METHOD: __X__ PERFORM ___ SIMULATE ___ DISCUSS

EVALUATION LOCATION: __X__ SIMULATOR ___ CONTROL ROOM ___ PLANT

PROJECTED TIME: __15 MIN__ SIMULATOR IC NUMBER: __IC-217 (Base – 123)__

ALTERNATE PATH __X__ TIME CRITICAL ___ PRA ___

JPM DIRECTIONS:

1. Examinee will be provided a marked up copy of STP-5.0. All other references of the simulator will be available at the examinee's discretion.
    a. STP-5.0 will be marked as follows:
        i. Sections 4.1, step 1 &2, 4.2 through 4.8 marked N/A.
2. The actions of this task are intended to be performed on an Active Simulator in which the examinee may diagnose the correctness of system response to his/her actions and respond to any abnormal conditions which may arise.
3. NO Cues are required by the examiner.

TASK STANDARD: Upon successful completion of this JPM, the examinee will:

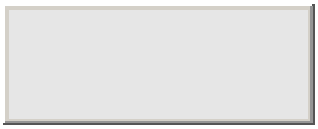
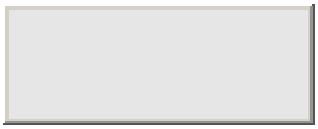
- Inserted Control Bank D in BANK control $\geq$ 10 but $\leq$15 steps per Section 4.9 of STP-5.0;
- Initiate an Rx trip due to rods continue to move.

Examinee:	
Overall JPM Performance:	**Satisfactory** ☐ **Unsatisfactory** ☐
Evaluator Comments (attach additional sheets if necessary)	

EXAMINER: _____

Developer	S. Jackson	Date: 4/8/15
NRC Approval	SEE NUREG 1021 FORM ES-301-3	

Simulator Setup

EVENT DESCRIPTION	ACTION	DETAILS
Reset into IC-217		
Acknowledge computer alarms		
Freeze Xe		
Run / Freeze Simulator		
Clear Ovation Alarms		
Acknowledge Alarms		
Turn Horns ON		
Run / Freeze Simulator		
Un-freeze Xe		

CONDITIONS

When I tell you to begin, you are to **perform step 4.9 of STP-5.0, Full Length Control Rod Operability Test.**

The conditions under which this task is to be performed are:

a. The Plant is at 72.5 % power.
b. Previous STP-5.0 performance was UNSAT due to Control Bank D testing.
c. Maintenance is complete and a partial performance of STP-5.0 is required for Post Maintenance Acceptance Testing.

Your task is to perform Section 4.9 of STP-5.0.

INITIATING **CUE**: "You may begin."

EVALUATION CHECKLIST

ELEMENTS:	STANDARDS:	RESULTS: (CIRCLE)

START TIME: _____

NOTE:
- NMP-OS-001 Section 4.3: Step 3 states that the OATC is required to obtain concurrence prior to performing planned reactivity manipulations. ALSO, Step 6 REQUIRES that these manipulations are PEER CHECKED.

If requested prior to rod motion CUE: "The SS concurs with your Reactivity manipulation."
"A PEER CHECK request is acknowledged"

Note: The following steps are from STP-5.0, Full Length Control Rod Operability Test, Section 4.9

1.	1 RECORD the STEP COUNTER reading for Control Bank D Groups 1 and 2.	RECORD 190 steps for both Control Bank D: o Group 1 o Group 2	S / U
*2.	2 Place the ROD CONTROL BANK SELECTOR SWITCH in the CB D position	POSITION the ROD BANK SELECTOR SWITCH COUNTER CLOCKWISE-to the CBD position	S / U
3.	3 Verify indicated control rod speed is approximately 48 steps per min on SI-408.	Observes SI-408 approximately 48 steps per min.	S / U

ELEMENTS:		STANDARDS:	RESULTS: (CIRCLE)
*4.	4 IF at power, perform the following: a Using CONTROL ROD MOTION switch, drive Control Bank D IN 1 to 2 steps. • Check CONT BANK D1 Step Counter change. • Check CONT BANK D2 Step Counter change.	Moves CONTROL ROD MOTION switch UP, and releases when 1 to 2 steps are indicated on Step Counters D1 and D2.	S / U

NOTE: The actions of the following element will cause FF5, COMP ALARM ROD SEQ/DEV OR PR FLUX TILT, alarm. This is an expected alarm per P&L 2.10

*5.	b While observing RODS IN light, using CONTROL ROD MOTION switch, drive Control Bank D IN a total of 10 steps from value recorded in Step 1	Moves CONTROL ROD MOTION switch UP, and releases when 10 steps are indicated on Step Counters D1 and D2.	S / U

Note: When the applicant releases the Rod Control Switch, the rods will continue to move in. This begins the ALTERNATE path

Note: The following steps are from AOP-19, Malfunction of Rod Control System.

Note: Since the Rod Control Selector Switch is in the CB D position, the applicant may try selecting MANUAL first. This will not stop rod motion.

6.	1.1 IF rod control in AUTO, THEN place rod control in MANUAL.	Rods are in CDB. Goes to RNO column.	S / U
7.	1.1 (RNO) IF rod control in MANUAL THEN place in AUTO 1.1.1 IF AUTO rod motion due to TAVG/TREF mismatch, THEN verify rod motion stops when TAVG is within 1 degree of TREF.	Rod Control Switch placed in AUTO. Observes rods continue to move. This step is N/A	S / U

	ELEMENTS:	STANDARDS:	RESULTS: (CIRCLE)
8.	1.2 Check Rod motion stopped	Observes rods continue to move	S / U
*9.	1.2.1 (RNO) Trip the reactor	Either Reactor Trip handswitch to taken to TRIP (Counter Clockwise). Observes Rx trip breakers open.	S / U
10.	1.2.2 (RNO) Go to FNP-1-EEP-0, REACTOR TRIP OR SAFETY INJECTION.		S / U

Note: The following steps are from FNP-1-EEP-0, REACTOR TRIP OR SAFETY INJECTION.
It is the intent to allow the applicant to perform the Immediate Operator Actions of EEP-0 then terminate the JPM

11.	1 Check Reactor Trip	Observes – Rx trip and Bypass breakers open, nuclear power falling and DRPI rod bottom lights lit.	S / U
12.	2 Check turbine trip	Observes TSLB2, 14-1, 14-2, 14-3, 14-4 lights are LIT	S / U
13.	3 Verify power to 4160V ESF busses		
	3.1 4160V ESF Busses – AT LEAST ONE ENERGIZED	Observes 1F and 1G power available lights are LIT	S / U
14.	3.2 4160V ESF Busses – BOTH TRAINS ENERGIZED	Observes 1F & 1K and 1G & 1L power available lights are LIT	S / U
15.	3.3 [CA] Verify operating diesel generator(s) – SUPPLIED FROM AT LEAST ONE SW PUMP	This step is N/A	S / U

ELEMENTS:		STANDARDS:	RESULTS: (CIRCLE)
16.	4 Check SI Status 4.1 Check any SI actuated indication. [] BYP & PERM SI ACTUATED status light [] MLB-1 1-1 LIT [] MLB-1 11-1 LIT	Observes lights NOT LIT	S / U
17.	4.1(RNO) Check SI required 4.1.1 IF any setpont and coincidence shown in the Table below has been reached or exceeded THEN Si is required	Observes parameters do not exceed setpoint	S / U

Signal	Setpoint	Coincidence	TSLB
PRZR PRESS LO (If not blocked)	1850 psig	2/3	TSLB2 17-1 17-2 17-3
STEAM LINE DIFFERENTIAL PRESSURE	100 psid	1 steam line 100 psig less than other two on 2/3 protection sets	TSLB4 10-2, 10-3, 10-4, 11-2, 11-3, 11-4, 12-2, 12-3, 12-4, 13-2, 13-3, 13-4, 14-2, 14-3, 14-4, 15-2, 15-3, 15-4,
LOW STEAM LINE PRESS. (If not blocked)	585 psig (rate compensated)	2/3	TSLB4 19-2 19-3 19-4
CONTAINMENT PRESSURE HIGH	4 psig	2/3	TSLB1 1-2 1-3 1-4

18.	4.1.2 IF SI is required, THEN actuate SI	This step is N/A	S / U
19.	Informs the Shift Supervisor that their IOA's of EEP-0 are complete.	CUE: SS acknowledges the completion of the IOA's of EEP-0	S / U

ELEMENTS: **STANDARDS:** **RESULTS: (CIRCLE)**

_____ STOP TIME

Terminate when the IOAs of EEP-0 are complete

CRITICAL ELEMENTS: Critical Elements are denoted with an asterisk (*) before the element number.

GENERAL REFERENCES:

1. PROCEDURE: FNP-1-AOP-19.0, V 31
2. FNP-1-EEP-0.0, Rev 45
3. FNP-1-STP-5.0, ver 31
4. K/As: 001A2.11 – 4.4 / 4.7
   001A3.02 – 3.7 / 3.6
   001AA1.05 – 4.3 / 4.2

GENERAL TOOLS AND EQUIPMENT:

Provide/Acquire:

1. A marked up copy of FNP-1-STP-5.0; mark up as described in INSTRUCTIONS.
2. AOP-19.0, EEP-0.0 will be acquired from Simulator (IOA pages will require cleaning/replacements)

Critical ELEMENT justification:

1. Not critical - This is a logging step only.
2. CRITICAL- Required for task completion, movement of PROPER rod bank.
3. Not critical - Check step only

4 - 5 CRITICAL- Required for task completion.

6 - 8 Not critical – No effect on rods

9 CRITICAL - Required due to malfunction of rod control causing DNB pressure exceeding limit.

10-19 Not critical – No actions required.

COMMENTS:

jpm g

CONDITIONS

When I tell you to begin, you are to **perform Section 4.9 of STP-5.0, Full Length Control Rod Operability Test.**

The conditions under which this task is to be performed are:

a. The Plant is at 72.5 % power.
b. Previous STP-5.0 performance was UNSAT due to Control Bank D testing.
c. Maintenance is complete and a partial performance of STP-5.0 is required for Post Maintenance Acceptance Testing.

Your task is to perform Section 4.9 of STP-5.0.

SOUTHERN COMPANY

FARLEY
Unit 1

SAFETY RELATED

FNP-1-STP-5.0

Full Length Control Rod Operability Test

VERSION 31.0

PROCEDURE LEVEL OF USE CLASSIFICATION PER NMP-AP-003	
CATEGORY	**SECTIONS**
Continuous	ALL
Reference	NONE
Information	NONE

Approval: David L Reed (Approved By) 04/19/2015 (Date)

Effective Date:

OPERATIONS
Responsible Department

VERSION SUMMARY
Version 31.0 DESCRIPTION
Updated to fleet template and latest writer's guide.

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2 SURVEILLANCE TEST REVIEW SHEET....25

1.0 PURPOSE

1. To demonstrate operability of full length control rods.

2. Acceptance Criteria: - Each full length control rod not fully inserted responds correctly to control signals and is moved at least 10 steps in either direction.

2.0 PRECAUTIONS AND LIMITATIONS

1. Variations in turbine load and boron concentration should be avoided during this test. ☑

2. Carefully monitor reactor conditions during all rod manipulations. Correct any abnormal conditions by repositioning control bank being used for control. ☑

3. Before testing next control bank, ensure all parameters return to original values after tested control bank has been returned to original position. ☑

4. Before transferring to automatic reactor control, manually adjust Tavg to within ± 1°F of reference temperature to avoid transient following transfer. ☑

5. Unless being performed during reactor startup, when rods are being operated in MAN or AUTO, ensure rods are above LOW-LOW Insertion Limit by minimum of 10 steps. Concerning Control banks A,B,C,D and Shutdown banks A and B being operated in Individual Bank Select mode, Rod Insertion Limits provided on Curve 2 do not apply. Any single bank may be inserted as far as 15 steps from ARO position for this test.
(Ref. Core Analysis procedure NF-CAP-200, Attachment 1 Step 14)
(CR 2009100757) ☑

6. Whenever DRPI is in half accuracy for any given RCCA, it may not be possible to achieve required change in indication to verify rod movement by inserting control rods only 10 steps. Per Precaution and Limitation 5, Control Banks A, B, C, D and Shutdown Banks A and B may be inserted as far as 15 steps from ARO position for this test. Prior to inserting any control rod greater than 12 steps, a review of Tech. Spec. 3.1.4 shall be performed and Shift Manager permission shall be obtained before group demand position exceeds DRPI indicated position by 12 steps. Document any bank insertion greater than 10 steps required by procedure to satisfy Acceptance Criteria on STRS. ☑

7. IF any rod in a bank is determined to be INOPERABLE, return rod to OPERABLE status before testing next rod bank. ☑

8. Only steps for applicable shutdown bank or control bank being tested need to be signed off. Other steps can be marked N/A with Shift Supervisor's review and approval as designated by his initial next to steps marked N/A. ☑

9. Shutdown bank and control bank testing may be performed in any sequence. ☑

2.0 PRECAUTIONS AND LIMITATIONS (continued)

10. FF5 - COMP ALARM ROD SEQ/DEV OR PR FLUX TILT is expected during this test. ☑

11. Depending on initial rod height and rod full out position, the following alarms may be expected during test:

    - FE1 - CONT ROD BANK POSITION LO ☑
    - FD5 - BANK D FULL ROD WTHDRL AUTO ROD STOP (220 steps) ☑

12. Condition report is to be generated when any alarm function is suspected to be INOPERABLE. ☑

13. Due to potential for dropped rod and resultant reactor trip, for any control rod anomaly promptly contact and discuss event with management. **(CR2005105949)** ☑

14. Guidance in this procedure has potential to impact reactivity. Close coordination with control room operators is required to ensure proper reactivity management per NMP-OS-001, Reactivity Management Program. ☑

15. SM/SS shall be notified if any acceptance criteria not satisfied. ☑

16. This procedure may contain previously evaluated Critical Steps that may not be applicable in certain plant conditions. Evaluation of this procedure for Critical Steps is performed during Pre-Job briefing. Decision concerning how to address error precursors for critical steps should be governed by NMP-GM-005-002, Human Performance Tools Instruction. ☑

17. The purpose for initially moving each bank 1 Step (2 half-steps) is to check each selected group gets the signal to move <u>AND</u> each Step Counter changes. **(CR 733783, 851994)** ☑

3.0 INITIAL CONDITIONS

1.	Version of this procedure has been verified to be current version. **(OR 1-98-498)**	SJJ
2.	This procedure has been verified to be correct procedure for task. **(OR 1-98-498)**	SJJ
3.	This procedure has been verified to be correct unit for task. **(OR 1-98-498)**	SJJ
4.	IF in MODE 3, requirements are met for enabling rod control per FNP-1-STP-35.1C, Enabling Rod Control System Surveillance Checklist. **(IR 2-96-025)**	SJJ
5.	Rod Control System is aligned per FNP-1-SOP-41.0, Control Rod Drive and Position Indication System.	SJJ
6.	Reactor trip breakers CLOSED.	SJJ

NOTE

Asterisked steps (*) are those associated with Acceptance Criteria. ☐

4.0 INSTRUCTIONS

NOTE

IF this procedure is only being used to test/troubleshoot rod control circuit using Control Bank D, remainder of Section 4.0 may be marked N/A and Attachment 1 completed. ☐

4.1 SECTION DETERMINATION

1. IF performing rod operability testing during reactor startup, **go to** Section 4.2. N/A

2. IF performing rod operability testing per FNP-0-ETP-3643, Verification Of Rod Control System Operability, **go to** Section 4.3. N/A

3. IF performing normal surveillance OR troubleshooting activities, **go to** desired Section for testing. SJJ

N/A

4.2 ROD OPERABILITY TESTING DURING REACTOR STARTUP

1. **Mark** Section 4.3 through Section 4.9 as N/A. _____

NOTE

Completion of Step 2 gives credit for this STP. ☐

2. As each bank is withdrawn at least 10 steps, **complete** Table 1. _____

BT

3. *__Check__ Rods move greater than or equal to 10 steps. _____

ACCEPTANCE CRITERIA

Rods move greater than or equal to 10 steps.

4. **Go to** Section 4.10. _____

N/A

N/A

4.3 ROD OPERABILITY TESTING PER FNP-0-ETP-3643

1. **Mark** Section 4.4 through Section 4.9 as N/A. _____

NOTE
Completion of Step 2 gives credit for this STP. ☐

2. As each bank is withdrawn at least 10 steps, **complete** Table 1. _____

3. *__Check__ Rods move greater than or equal to 10 steps. _____

ACCEPTANCE CRITERIA
Rods move greater than or equal to 10 steps.

BT

4. **Go to** Section 4.10. _____

4.4 TESTING SHUTDOWN BANK A

1. **Record** STEP COUNTER reading for Shutdown Bank A Groups 1 and 2.

   - SHUTDN BANK A1 _____
   - SHUTDN BANK A2 _____

2. **Place** ROD CONTROL BANK SELECTOR SWITCH in SB A. _____

3. On SI-408, CONT ROD SPEED, **check** indicated control rod speed approximately 62 STEPS/MIN. _____

4. IF Shutdown Bank A withdrawn, **perform** the following:

   a. Using CONTROL ROD MOTION switch, **drive** Shutdown Bank A IN 1 to 2 steps. _____

      - **Check** SHUTDN BANK A1 Step Counter change. _____
      - **Check** SHUTDN BANK A2 Step Counter change. _____

   b. While observing RODS IN light, using CONTROL ROD MOTION switch, **drive** Shutdown Bank A IN a total of 10 steps from value recorded in Step 1. _____

   c. Using DRPI system indicators, **check** individual rod movement. _____

   d. IF individual rod movement indicated, **perform** the following:

      (1) **Mark** Step 4.e(1) AND Step 4.e(2) N/A. _____

      (2) **Proceed to** Step 4.f. _____

N/A

N/A

4.4 TESTING SHUTDOWN BANK A (continued)

4. (continued)

e. IF individual rod movement NOT indicated, **perform** the following:

(1) **Review** Precaution and Limitation 6. _____

(2) While observing RODS IN light, using CONTROL ROD MOTION switch, **drive** Shutdown Bank A up to 5 additional steps IN OR until DRPI indication changes. _____

f. While observing RODS OUT light, using CONTROL ROD MOTION switch, **return** Shutdown Bank A to original position recorded in Step 1. _____

BT

g. Using DRPI system indicators, **check** individual rod movement. _____

h. ***Check** satisfactory or unsatisfactory movement of each Shutdown Bank A rod. _____

ACCEPTANCE CRITERIA

Rods move greater than or equal to 10 steps.

(1) **Record** results in Table 1 _____

5. IF Shutdown Bank A inserted, **perform** the following:

a. Using CONTROL ROD MOTION switch, **pull** Shutdown Bank A OUT 1 to 2 steps. _____

- **Check** SHUTDN BANK A1 Step Counter change. _____
- **Check** SHUTDN BANK A2 Step Counter change. _____

b. While observing RODS OUT light, using CONTROL ROD MOTION switch, **pull** Shutdown Bank A OUT a total of 10 steps from value recorded in Step 1. _____

c. Using DRPI system indicators, **check** individual rod movement. _____

d. While observing RODS IN light, using CONTROL ROD MOTION switch, **return** Shutdown Bank A to original position recorded in Step 1. _____

e. Using DRPI system indicators, **check** individual rod movement. _____

N/A

N/A

4.4 TESTING SHUTDOWN BANK A (continued)

5. (continued)

   f. ***Check** satisfactory or unsatisfactory movement of each Shutdown Bank A rod. _____

ACCEPTANCE CRITERIA
Rods move greater than or equal to 10 steps.

   (1) **Record** results in Table 1 _____

6. IF required to re-establish stable reactor conditions, **perform** the following:

   a. **Return** ROD CONTROL BANK SELECTOR SWITCH to MAN or AUTO. _____

   b. **Check** proper indicated control rod speed:

   BT

   - IF ROD CONTROL BANK SELECTOR SWITCH in MAN, on SI-408, CONT ROD SPEED, **check** indicated control rod speed approximately 48 STEPS/MIN. _____
   - IF ROD CONTROL BANK SELECTOR SWITCH in AUTO, on SI-408, CONT ROD SPEED, **check** indicated control rod speed approximately 8 STEPS/MIN. _____

4.5 TESTING SHUTDOWN BANK B

1. **Record** STEP COUNTER reading for Shutdown Bank B Groups 1 and 2.

   - SHUTDN BANK B1 _____
   - SHUTDN BANK B2 _____

2. **Place** ROD CONTROL BANK SELECTOR SWITCH in SB B. _____

3. On SI-408, CONT ROD SPEED, **check** indicated control rod speed approximately 62 STEPS/MIN. _____

4. IF Shutdown Bank B withdrawn, **perform** the following:

   a. Using CONTROL ROD MOTION switch, **drive** Shutdown Bank B IN 1 to 2 steps. _____

   - **Check** SHUTDN BANK B1 Step Counter change. _____
   - **Check** SHUTDN BANK B2 Step Counter change. _____

N/A

N/A

4.5 TESTING SHUTDOWN BANK B (continued)

4. (continued)

b. While observing RODS IN light, using CONTROL ROD MOTION switch, **drive** Shutdown Bank B IN a total of 10 steps from value recorded in Step 1. _____

c. Using DRPI system indicators, **check** individual rod movement. _____

d. IF individual rod movement indicated, **perform** the following:

(1) **Mark** Step 4.e(1) AND Step 4.e(2) N/A. _____

(2) **Proceed to** Step 4.f. _____

e. IF individual rod movement NOT indicated, **perform** the following:

BT

(1) **Review** Precaution and Limitation 6. _____

(2) While observing RODS IN light, using CONTROL ROD MOTION switch, **drive** Shutdown Bank B up to 5 additional steps IN OR until DRPI indication changes. _____

f. While observing RODS OUT light, using CONTROL ROD MOTION switch, **return** Shutdown Bank B to original position recorded in Step 1. _____

g. Using DRPI system indicators, **check** individual rod movement. _____

h. ***Check** satisfactory or unsatisfactory movement of each Shutdown Bank B rod. _____

ACCEPTANCE CRITERIA

Rods move greater than or equal to 10 steps.

(1) **Record** results in Table 1 _____

5. IF Shutdown Bank B inserted, **perform** the following:

a. Using CONTROL ROD MOTION switch, **pull** Shutdown Bank B OUT 1 to 2 steps. _____

- **Check** SHUTDN BANK B1 Step Counter change. _____
- **Check** SHUTDN BANK B2 Step Counter change. _____

b. While observing RODS OUT light, using CONTROL ROD MOTION switch, **pull** Shutdown Bank A OUT a total of 10 steps from value recorded in Step 1. _____

c. While observing RODS OUT light, using CONTROL ROD MOTION switch, **pull** Shutdown Bank B 10 steps OUT. _____

N/A

N/A

4.5 TESTING SHUTDOWN BANK B (continued)

5. (continued)

   d. Using DRPI system indicators, **check** individual rod movement. _____

   e. While observing RODS IN light, using CONTROL ROD MOTION switch, **return** Shutdown Bank B to original position recorded in Step 1. _____

   f. Using DRPI system indicators, **check** individual rod movement. _____

   g. ***Check** satisfactory or unsatisfactory movement of each Shutdown Bank B rod. _____

ACCEPTANCE CRITERIA
Rods move greater than or equal to 10 steps.

   (1) **Record** results in Table 1 _____

BT

6. IF required to re-establish stable reactor conditions, **perform** the following:

   a. **Return** ROD CONTROL BANK SELECTOR SWITCH to MAN or AUTO. _____

   b. **Check** proper indicated control rod speed:

   - IF ROD CONTROL BANK SELECTOR SWITCH in MAN, on SI-408, CONT ROD SPEED, **check** indicated control rod speed approximately 48 STEPS/MIN. _____
   - IF ROD CONTROL BANK SELECTOR SWITCH in AUTO, on SI-408, CONT ROD SPEED, **check** indicated control rod speed approximately 8 STEPS/MIN. _____

4.6 TESTING CONTROL BANK A

1. **Record** STEP COUNTER reading for Control Bank A Groups 1 and 2.

   - CONT BANK A1 _____
   - CONT BANK A2 _____

2. **Place** ROD CONTROL BANK SELECTOR SWITCH in CB A. _____

3. On SI-408, CONT ROD SPEED, **check** indicated control rod speed approximately 48 STEPS/MIN. _____

N/A

N/A

4.6 TESTING CONTROL BANK A (continued)

4. IF at power, **perform** the following:

   a. Using CONTROL ROD MOTION switch, **drive** Control Bank A IN 1 to 2 steps. _____

      - **Check** CONT BANK A1 Step Counter change. _____
      - **Check** CONT BANK A2 Step Counter change. _____

   b. While observing RODS IN light, using CONTROL ROD MOTION switch, **drive** Control Bank A IN a total of 10 steps from value recorded in Step 1. _____

   c. Using DRPI system indicators, **check** individual rod movement. _____

   d. IF individual rod movement indicated, **perform** the following:

      (1) **Mark** Step 4.e(1) AND Step 4.e(2) N/A. _____

      (2) **Proceed to** Step 4.f. _____

   e. IF individual rod movement NOT indicated, **perform** the following:

      (1) **Review** Precaution and Limitation 6. _____

      (2) While observing RODS IN light, using CONTROL ROD MOTION switch, **drive** Control Bank A up to 5 additional steps IN OR until DRPI indication changes. _____

   f. While observing RODS OUT light, using CONTROL ROD MOTION switch, **return** Control Bank A to original position recorded in Step 1. _____

   g. Using DRPI system indicators, **check** individual rod movement. _____

   h. ***Check** satisfactory or unsatisfactory movement of each Control Bank A rod. _____

ACCEPTANCE CRITERIA
Rods move greater than or equal to 10 steps.

      (1) **Record** results in Table 1 _____

5. IF prior to startup, **perform** the following:

   a. Using CONTROL ROD MOTION switch, **pull** Control Bank A OUT 1 to 2 steps. _____

      - **Check** CONT BANK A1 Step Counter change. _____
      - **Check** CONT BANK A2 Step Counter change. _____

BT

N/A

N/A

BT

N/A

4.6 TESTING CONTROL BANK A (continued)

5. (continued)

   b. While observing RODS OUT light, using CONTROL ROD MOTION switch, **pull** Control Bank A OUT a total of 10 steps from value recorded in Step 1. _____

   c. Using DRPI system indicators, **check** individual rod movement. _____

   d. While observing RODS IN light, using CONTROL ROD MOTION switch, **return** Control Bank A to original position recorded in Step 1. _____

   e. Using DRPI system indicators, **check** individual rod movement. _____

   f. ***Check** satisfactory or unsatisfactory movement of each Control Bank A rod. _____

ACCEPTANCE CRITERIA

Rods move greater than or equal to 10 steps.

   (1) **Record** results in Table 1 _____

6. IF required to re-establish stable reactor conditions, **perform** the following:

   a. **Return** ROD CONTROL BANK SELECTOR SWITCH to MAN or AUTO. _____

   b. **Check** proper indicated control rod speed:

   - IF ROD CONTROL BANK SELECTOR SWITCH in MAN, on SI-408, CONT ROD SPEED, **check** indicated control rod speed approximately 48 STEPS/MIN. _____
   - IF ROD CONTROL BANK SELECTOR SWITCH in AUTO, on SI-408, CONT ROD SPEED, **check** indicated control rod speed approximately 8 STEPS/MIN. _____

4.7 TESTING CONTROL BANK B

1. **Record** STEP COUNTER reading for Control Bank B Groups 1 and 2.

   - CONT BANK B1 _____
   - CONT BANK B2 _____

2. **Place** ROD CONTROL BANK SELECTOR SWITCH in CB B. _____

3. On SI-408, CONT ROD SPEED, **check** indicated control rod speed approximately 48 STEPS/MIN. _____

N/A

4.7 TESTING CONTROL BANK B (continued)

4. IF at power, **perform** the following:

   a. Using CONTROL ROD MOTION switch, **drive** Control Bank B IN 1 to 2 steps. _____

      - **Check** CONT BANK B1 Step Counter change. _____
      - **Check** CONT BANK B2 Step Counter change. _____

   b. While observing RODS IN light, using CONTROL ROD MOTION switch, **drive** Control Bank B IN a total of 10 steps from value recorded in Step 1. _____

   c. Using DRPI system indicators, **check** individual rod movement. _____

BT

   d. IF individual rod movement indicated, **perform** the following:

      (1) **Mark** Step 4.e(1) AND Step 4.e(2) N/A. _____

      (2) **Proceed to** Step 4.f. _____

   e. IF individual rod movement NOT indicated,, **perform** the following:

      (1) **Review** Precaution and Limitation 6. _____

      (2) While observing RODS IN light, using CONTROL ROD MOTION switch, **drive** Control Bank B up to 5 additional steps IN OR until DRPI indication changes. _____

   f. While observing RODS OUT light, using CONTROL ROD MOTION switch, **return** Control Bank B to original position recorded in Step 1. _____

   g. Using DRPI system indicators, **check** individual rod movement. _____

   h. ***Check** satisfactory or unsatisfactory movement of each Control Bank B rod. _____

ACCEPTANCE CRITERIA

Rods move greater than or equal to 10 steps.

      (1) **Record** results in Table 1 _____

N/A

N/A

4.7 TESTING CONTROL BANK B (continued)

5. IF prior to startup, **perform** the following:

   a. Using CONTROL ROD MOTION switch, **pull** Control Bank B OUT 1 to 2 steps. _____

   - **Check** CONT BANK B1 Step Counter change. _____
   - **Check** CONT BANK B2 Step Counter change. _____

   b. While observing RODS OUT light, using CONTROL ROD MOTION switch, **pull** Control Bank B OUT a total of 10 steps from value recorded in Step 1. _____

   c. Using DRPI system indicators, **check** individual rod movement. _____

   d. While observing RODS IN light, using CONTROL ROD MOTION switch, **return** Control Bank B to original position recorded in Step 1. _____

BT

   e. Using DRPI system indicators, **check** individual rod movement. _____

   f. ***Check** satisfactory or unsatisfactory movement of each Control Bank B rod. _____

ACCEPTANCE CRITERIA

Rods move greater than or equal to 10 steps.

   (1) **Record** results in Table 1 _____

6. IF required to re-establish stable reactor conditions, **perform** the following:

   a. **Return** ROD CONTROL BANK SELECTOR SWITCH to MAN or AUTO. _____

   b. **Check** proper indicated control rod speed:

   - IF ROD CONTROL BANK SELECTOR SWITCH in MAN, on SI-408, CONT ROD SPEED, **check** indicated control rod speed approximately 48 STEPS/MIN. _____
   - IF ROD CONTROL BANK SELECTOR SWITCH in AUTO, on SI-408, CONT ROD SPEED, **check** indicated control rod speed approximately 8 STEPS/MIN. _____

N/A

N/A

BT

N/A

4.8 TESTING CONTROL BANK C

1. **Record** STEP COUNTER reading for Control Bank C Groups 1 and 2.

   - CONT BANK C1 _____
   - CONT BANK C2 _____

2. **Place** ROD CONTROL BANK SELECTOR SWITCH in CB C. _____

3. On SI-408, CONT ROD SPEED, **check** indicated control rod speed approximately 48 STEPS/MIN. _____

4. IF at power, **perform** the following:

   a. Using CONTROL ROD MOTION switch, **drive** Control Bank C IN 1 to 2 steps. _____

      - **Check** CONT BANK C1 Step Counter change. _____
      - **Check** CONT BANK C2 Step Counter change. _____

   b. While observing RODS IN light, using CONTROL ROD MOTION switch, **drive** Control Bank C IN a total of 10 steps from value recorded in Step 1. _____

   c. Using DRPI system indicators, **check** individual rod movement. _____

   d. IF individual rod movement indicated, **perform** the following:

      (1) **Mark** Step 4.e(1) AND Step 4.e(2) N/A. _____

      (2) **Proceed to** Step 4.f. _____

   e. IF individual rod movement NOT indicated, **perform** the following:

      (1) **Review** Precaution and Limitation 6. _____

      (2) While observing RODS IN light, using CONTROL ROD MOTION switch, **drive** Control Bank C up to 5 additional steps IN OR until DRPI indication changes. _____

   f. While observing RODS OUT light, using CONTROL ROD MOTION switch, **return** Control Bank C to original position recorded in Step 1. _____

N/A

BT

N/A

4.8 TESTING CONTROL BANK C (continued)

4. (continued)

g. Using DRPI system indicators, **check** individual rod movement. _____

h. ***Check** satisfactory or unsatisfactory movement of each Control Bank C rod. _____

ACCEPTANCE CRITERIA

Rods move greater than or equal to 10 steps.

(1) **Record** results in Table 1 _____

5. IF prior to startup, **perform** the following:

a. Using CONTROL ROD MOTION switch, **pull** Control Bank C OUT 1 to 2 steps. _____

- **Check** CONT BANK C1 Step Counter change. _____
- **Check** CONT BANK C2 Step Counter change. _____

b. While observing RODS OUT light, using CONTROL ROD MOTION switch, **pull** Control Bank C OUT a total of 10 steps from value recorded in Step 1. _____

c. Using DRPI system indicators, **check** individual rod movement. _____

d. While observing RODS IN light, using CONTROL ROD MOTION switch, **return** Control Bank C to original position recorded in Step 1. _____

e. Using DRPI system indicators, **check** individual rod movement. _____

f. ***Check** satisfactory or unsatisfactory movement of each Control Bank C rod. _____

ACCEPTANCE CRITERIA

Rods move greater than or equal to 10 steps.

(1) **Record** results in Table 1 _____

N/A

BT

N/A

4.8 TESTING CONTROL BANK C (continued)

6. IF required to re-establish stable reactor conditions, **perform** the following:

   a. **Return** ROD CONTROL BANK SELECTOR SWITCH to MAN or AUTO. _____

   b. **Check** proper indicated control rod speed:

   - IF ROD CONTROL BANK SELECTOR SWITCH in MAN, on SI-408, CONT ROD SPEED, **check** indicated control rod speed approximately 48 STEPS/MIN. _____
   - IF ROD CONTROL BANK SELECTOR SWITCH in AUTO, on SI-408, CONT ROD SPEED, **check** indicated control rod speed approximately 8 STEPS/MIN. _____

4.9 TESTING CONTROL BANK D

1. **Record** STEP COUNTER reading for Control Bank D Groups 1 and 2.

   - CONT BANK D1 _____
   - CONT BANK D2 _____

2. **Place** ROD CONTROL BANK SELECTOR SWITCH in CB D. _____

3. On SI-408, CONT ROD SPEED, **check** indicated control rod speed approximately 48 STEPS/MIN. _____

4. IF at power, **perform** the following:

   a. Using CONTROL ROD MOTION switch, **drive** Control Bank D IN 1 to 2 steps. _____

   - **Check** CONT BANK D1 Step Counter change. _____
   - **Check** CONT BANK D2 Step Counter change. _____

   b. While observing RODS IN light, using CONTROL ROD MOTION switch, **drive** Control Bank D IN a total of 10 steps from value recorded in Step 1. _____

   c. Using DRPI system indicators, **check** individual rod movement. _____

   d. IF individual rod movement indicated, **perform** the following:

   (1) **Mark** Step 4.e(1) AND Step 4.e(2) N/A. _____

   (2) **Proceed to** Step 4.f. _____

4.9 TESTING CONTROL BANK D (continued)

4. (continued)

e. IF individual rod movement NOT indicated, **perform** the following:

(1) **Review** Precaution and Limitation 6. _____

(2) While observing RODS IN light, using CONTROL ROD MOTION switch, **drive** Control Bank D up to 5 additional steps IN OR until DRPI indication changes. _____

f. While observing RODS OUT light, using CONTROL ROD MOTION switch, **return** Control Bank D to original position recorded in Step 1. _____

g. Using DRPI system indicators, **check** individual rod movement. _____

h. ***Check** satisfactory or unsatisfactory movement of each Control Bank D rod. _____

ACCEPTANCE CRITERIA

Rods move greater than or equal to 10 steps.

(1) **Record** results in Table 1 _____

5. IF prior to startup, **perform** the following:

a. Using CONTROL ROD MOTION switch, **pull** Control Bank D OUT 1 to 2 steps. _____

- **Check** CONT BANK D1 Step Counter change. _____
- **Check** CONT BANK D2 Step Counter change. _____

b. While observing RODS OUT light, using CONTROL ROD MOTION switch, **pull** Control Bank D OUT a total of 10 steps from value recorded in Step 1. _____

c. Using DRPI system indicators, **check** individual rod movement. _____

d. While observing RODS IN light, using CONTROL ROD MOTION switch, **return** Control Bank D to original position recorded in Step 1. _____

4.9 TESTING CONTROL BANK D (continued)

5. (continued)

   e. Using DRPI system indicators, **check** individual rod movement. _____

   f. ***Check** satisfactory or unsatisfactory movement of each Control Bank D rod. _____

ACCEPTANCE CRITERIA
Rods move greater than or equal to 10 steps.

   (1) **Record** results in Table 1 _____

6. IF required to re-establish stable reactor conditions, **perform** the following:

   a. **Return** ROD CONTROL BANK SELECTOR SWITCH to MAN or AUTO. _____

   b. **Check** proper indicated control rod speed:

   - IF ROD CONTROL BANK SELECTOR SWITCH in MAN, on SI-408, CONT ROD SPEED, **check** indicated control rod speed approximately 48 STEPS/MIN. _____
   - IF ROD CONTROL BANK SELECTOR SWITCH in AUTO, on SI-408, CONT ROD SPEED, **check** indicated control rod speed approximately 8 STEPS/MIN. _____

4.10 P TO A CONVERTER CHECK

NOTE
Key B33 will be required to open P to A Converter Cabinet. ☐

1. In cabinet N1C11L007-N, at P-A Converter, **select** each Control Bank indicated below then **record** “BANK POSITION DISPLAY” in space provided.

Control Bank	Bank Position Display
A	
B	
C	
D	

2. **Return** P-A Converter display switch to OFF. _____

3. **Compare** each bank position display obtained in Step 1 to actual rod position. _____

   a. IF any discrepancies between P to A converter display and actual rod position noted, **notify** Shift Supervisor. _____

NOTE

Asterisked steps (*) are those associated with Acceptance Criteria. ☐

5.0 ACCEPTANCE CRITERIA

Each full length control rod not fully inserted responds correctly to control signals, and is moved at least 10 steps in either direction.

6.0 RECORDS

QA Record (X)	Non-QA Record (X)	Record Generated	Retention Time	R-Type
X		FNP-1-STP-5.0	LP	H06.045

7.0 REFERENCES

- U-266647, Precautions, Limitations and Setpoints for Nuclear Steam Supply Systems.
- NEL-98-0266 letter dated 7/16/98, from MJ Ajluni, to JR Johnson, titled "Generic Evaluation Regarding 15 Step Rod Operability Test."

BANK D ROD MOVEMENT FOR TROUBLESHOOTING

NOTE

The following sequence may be repeated as necessary for troubleshooting, however, subsequent performance should be delayed long enough to determine effect on axial offset. ☐

1. **Record** step counter reading for Control Bank D groups 1 and 2.

   - CONT BANK D1 _____
   - CONT BANK D2 _____

2. **Place** ROD CONTROL BANK SELECTOR SWITCH in MAN. _____

3. On SI-408, CONT ROD SPEED, **check** indicated control rod speed approximately 48 STEPS/MIN. _____

4. While observing RODS IN light, using control rod motion switch, **drive** Control Bank D in a total of 10 to 15 steps from value recorded in Step 1. _____

5. While observing RODS OUT light, using control rod motion switch, **return** Control Bank D to original position recorded in Step 1. _____

6. IF desired, **return** ROD CONTROL BANK SELECTOR SWITCH to AUTO. _____

7. **Check** proper indicated control rod speed as follows:

   - IF ROD CONTROL BANK SELECTOR SWITCH in MAN, on SI-408, CONT ROD SPEED, **check** indicated control rod speed approximately 48 STEPS/MIN. _____

   - IF ROD CONTROL BANK SELECTOR SWITCH in AUTO, on SI-408, CONT ROD SPEED, **check** indicated control rod speed approximately 8 STEPS/MIN. _____

TABLE 1
Page 1 of 1

ROD OPERABILITY CHECKS

NOTE
IF any Rod in a Bank is determined INOPERABLE, Rod must be returned to OPERABLE status before testing next Rod Bank. ☐

SHUTDOWN BANK A		SHUTDOWN BANK B		CONTROL BANK A		CONTROL BANK B		CONTROL BANK C		CONTROL BANK D	
	SAT/UNSAT		SAT/UNSAT		SAT/UNSAT		SAT/UNSAT		SAT/UNSAT		SAT/UNSAT
Rod G3	/	Rod E5	/	Rod F2	/	Rod F4	/	Rod D4	/	Rod H2	/
Rod C9	/	Rod E11	/	Rod B10	/	Rod D10	/	Rod D12	/	Rod B8	/
Rod J13	/	Rod L11	/	Rod K14	/	Rod K12	/	Rod M12	/	Rod H14	/
Rod N7	/	Rod L5	/	Rod P6	/	Rod M6	/	Rod M4	/	Rod P8	/
Rod J3	/	Rod G7	/	Rod K2	/	Rod K4	/	Rod H6	/	Rod F6	/
Rod C7	/	Rod G9	/	Rod B6	/	Rod D6	/	Rod F8	/	Rod F10	/
Rod G13	/	Rod J9	/	Rod F14	/	Rod F12	/	Rod H10	/	Rod K10	/
Rod N9	/	Rod J7	/	Rod P10	/	Rod M10	/	Rod K8	/	Rod K6	/

ATTACHMENT 2
Page 1 of 1

SURVEILLANCE TEST REVIEW SHEET

Mode(s) Requiring Test: 1, 2	**Technical Specification Reference** SR 3.1.4.2

To Be Completed by Test Performer(s)	Start Date/Time ____/____

Test Performers (Printed Name)	**Initial**	**Signature**

Completed by:		Date/Time	____/____
Component or Train Tested (If applicable):			
☐ **ENTIRE PROCEDURE WAS PERFORMED**		☐ FOR SURVEILLANCE CREDIT	
☐ **PARTIAL PROCEDURE WAS PERFORMED**		☐ NOT FOR SURVEILLANCE CREDIT	
Reason for partial procedure performance:			
Test Completed:	☐ **Satisfactory**	☐	**Unsatisfactory**

☐ The following deficiencies occurred:

☐ Corrective action was taken or initiated:

Performing Review Group

Reviewed by:		Date/Time	____/____

☐ Procedure was properly completed and was satisfactory

☐ **Comments**:

Engineering Support Group Screening (If applicable)

Screened by:		Date	

☐ **Comments**:

FARLEY NUCLEAR PLANT

ABNORMAL OPERATING PROCEDURE

FNP-1-AOP-19.0

SAFETY RELATED

MALFUNCTION OF ROD CONTROL SYSTEM

PROCEDURE LEVEL OF USE CLASSIFICATION PER NMP-AP-003	
CATEGORY	**SECTIONS**
Continuous:	**Remainder of Procedure**
Reference:	**Section 1.1**
Information:	**NONE**

Approved: David L Reed Effective Date: 02/08/2015

Operations

UNIT 1

Table of Contents

PROCEDURE CONTAINS	NUMBER OF PAGES
Body	25

A. Purpose

This procedure provides actions for response to a malfunction of the rod control system.

This procedure is applicable when the rod control system is capable of rod withdrawal.
This procedure is NOT applicable for rod position indication malfunctions.

NOTES:
- A rod is considered "dropped" if it has fallen completely to the bottom of the core.
- A rod is considered “deeply misaligned” if its DRPI indication disagrees with the group step counter by greater than 45 steps.
- A rod is considered “misaligned” if its DRPI indication disagrees with the group step counter by greater than 12 steps but less than or equal to 45 steps.
- “Dropped” and “Deeply Misaligned” rods will be treated the same.
- Technical Specifications requires that all individual indicated rod positions be within 12 steps of their group step counter demand position.
- In general the rod group step counters and the DRPI rod position indications should agree within ± four steps.

B. Symptoms or Entry Conditions

I. This procedure divided into the following sections.

a. Section 1.1 Uncontrolled Continuous Rod Motion In All Modes.

b. Section 1.2 Misaligned Rods In Mode 1.

c. Section 1.3 Dropped Rods in Mode 1.

d. Section 1.4 Dropped Or Misaligned Rods In Modes 2 Through 5.

II. A section is entered when a malfunction of the rod control system is indicated by any of the following:

a. Significant reactivity insertion due to undesired rod motion.

b. Failure of a control bank to move when required.

c. One or more dropped rods in Mode 1 OR during reactor startup.

d. One or more rods misaligned in Mode 1 OR during reactor startup.

RECORDS

QA Record (X)	Non-QA Record (X)	Record Generated	Retention Time	R-Type
X		FNP-1-AOP-19.0	LP	H06.001

Step	Action/Expected Response	Response Not Obtained

Section 1.1

Uncontrolled Continuous Rod Motion In All Modes

NOTE: Step 1 is an IMMEDIATE OPERATOR action.

__ **1 IF undesired rod motion occurring, THEN stop rod motion.**

1.1 IF rod control in AUTO, THEN place rod control in MANUAL.

1.1 IF rod control in MANUAL, THEN place rod control in AUTO.

NOTE: In AUTO rod control, rods will step OUT if TAVG less than TREF by at least 1.5 degrees, and Rods will step IN if TAVG greater than TREF by at least 1.5 degrees.

1.1.1 IF AUTO rod motion due to TAVG/TREF mismatch, THEN verify rod motion stops when TAVG is within 1 degree of TREF.

1.2 Check Rod motion - STOPPED.

1.2 Perform the following:

1.2.1 Trip the reactor.

1.2.2 Go to FNP-1-EEP-0, REACTOR TRIP OR SAFETY INJECTION.

__ **2 Evaluate undesired rod motion.**

2.1 Check N-44 Operable.

2.1 Go to FNP-1-AOP-100.0, INSTRUMENTATION MALFUNCTION.

2.2 Check selected Pimp channel Operable.

2.2 Go to FNP-1-AOP-100.0, INSTRUMENTATION MALFUNCTION.

__Page Completed

Step	Action/Expected Response	Response Not Obtained

Section 1.1

Uncontrolled Continuous Rod Motion In All Modes

__	**3**	Check the following alarms - CLEAR. • Annunciator FE1 - CONT ROD BANK POSITION LO • Annunciator FE2 - CONT ROD BANK POSITION LO-LO	3. IF in Mode 1 or 2, THEN perform the following: • Borate as necessary to restore Rod height. • Initiate the following: TS 3.1.5 TS 3.1.6
__	**4**	Restore Tavg to program by adjusting turbine load.	4. Adjust RCS boron concentration to restore Tavg to program.
__	**5**	Maintain power distribution when greater than or equal to 50% power:	
	5.1	AFD - WITHIN LIMITS SPECIFIED IN COLR (TS 3.2.3)	5.1 Reduce power to less than 50% within 30 minutes.
	5.2	QPTR - LESS THAN OR EQUAL TO 1.02	5.2 Initiate TS 3.2.4.

__Page Completed

Step	Action/Expected Response	Response Not Obtained

Section 1.1

Uncontrolled Continuous Rod Motion In All Modes

NOTE: Any transient resulting from undesired rod motion should consider the following limits when evaluating continued plant operation.

- Pressurizer level greater than 15%
- Pressurizer Pressure greater than 2100 psig
- SG narrow range levels between 35% and 75%
- TAVG between 541°F and 580°F
- Control Rod Bank position Lo-Lo Annunciator FE2 Clear
- Delta I within limits specified in the COLR

__ **6 IF rod motion is NOT available in AUTO OR MANUAL, AND rod motion required, THEN perform the following:**

6.1 Trip the reactor.

6.2 Go to FNP-1-EEP-0, REACTOR TRIP OR SAFETY INJECTION.

__ **7 Initiate repairs as necessary.**

__ **8 Go to procedure in effect.**

__Page Completed

UNIT 1

Step	Action/Expected Response	Response Not Obtained

Section 1.2

Misaligned Rods In Mode 1

__ **1** **Stop any turbine load change in progress.**

__ **2** **Check only one Rod – Misaligned.**

2 Trip the Reactor.

2.1 Go to FNP-1-EEP-0, REACTOR TRIP OR SAFETY INJECTION

__ **3** **Check misaligned Rod – Misaligned By Greater Than 12 Steps.**

3 Go to FNP-1-SOP-41.0, CONTROL ROD DRIVE AND POSITION INDICATION SYSTEM, to address restoration of the misaligned rod.

__ **4** **Check rod misaligned less than or equal to 45 steps from demand.**

4 Go to Section 1.3, Dropped Rods in Mode 1.

__ **5** **Initiate TS 3.1.4 and TS 3.1.7.**

NOTE: Power reduction as soon as practical after the rod drop occurs minimizes local fuel power distribution variances and the chances of fuel damage. Although TS 3.1.4 requires power to be reduced to less than 75% within 2 hours, a target of achieving reactor power level less than 75% in one hour meets the "as soon as practical" objective.

__ **6** **Reduce Thermal Power to less than 75% within 1 hour from the time of discovery of Rod Misalignment using FNP-1-UOP-3.1, POWER OPERATION.**

__ **7** **Check fuel preconditioned power level greater than or equal to 90% per reactor Engineering**.

7 Continue power reduction to the greater of the following, at a rate not to exceed 25% per hour:

- 25% RTP below the fuel's preconditioned power level.

  OR

- 30% RTP

__ **8** **[CA]Maintain reduced power level until rod recovery initiated**.

__Page Completed

Step	Action/Expected Response	Response Not Obtained

Section 1.2

Misaligned Rods In Mode 1

__ **9 Notify the Shift Manager of misaligned rod.**

__ **10 Direct Reactor Engineering to develop a misaligned recovery plan.**

__ **11 [CA]Maintain Tavg at program by performing the following as appropriate:**

- Adjust turbine load.
- Dilute or borate.
- Use manual Rod control

__ **12 [CA]Maintain power distribution when greater than or equal to 50% power.**

12.1	AFD – within limits specified in the COLR.	12.1 Adjust power and/or rods until one of the following are met: • AFD within plus or minus 5% of target. OR • Reactor power less than 50%.
12.2	QPTR – less than or equal to 1.02.	12.2 Initiate TS 3.2.4.

__Page Completed

Step	Action/Expected Response	Response Not Obtained

Section 1.2

Misaligned Rods In Mode 1

__ **13 Initiate action to determine cause and repair Rod Control malfunction.**

__ **14 Record the following in the Control Room Log.**

- Time of Rod misalignment
- Misaligned Rod number
- Misaligned Rod position (DRPI)
- Affected bank position (Demand and DRPI)
- Initial power level

14 IF exact time of Rod misalignment is NOT known, THEN use time of previous Rod alignment verification performed in FNP-1-STP-1.0, OPERATION SHIFT AND DAILY SURVEILLANCE REQUIREMENTS.

__ **15 Check if Rod alignment should be initiated:**

15.1 Direct cause of misaligned Rod known and corrective actions have been taken.

15.1 Do not proceed with rod realignment until approval to do so is obtained from reactor Engineering and Operations Management.

15.2 Rod to be recovered is within 120 hours of initial misalignment.

15.2 Notify nuclear fuels to determine impact on Safety Analysis and recovery effort.

15.2.1 IF Safety Analysis cannot be confirmed within 120 hours, THEN, go to FNP-1-UOP-3.1, POWER OPERATION and initiate a unit shutdown to Mode 3.

15.3 Misaligned rod recovery plan in place.

15.3 WHEN misaligned rod recovery plan in place, continue with step 16.

__ **16 [CA]Maintain reduced power level during realignment.**

__ **17 Maintain power distribution limits:**

- AFD
- QPTR

__ **18 [CA]Maintain Tavg within 3°F of Tref during realignment.**

__Page Completed

Step	Action/Expected Response	Response Not Obtained

Section 1.2

Misaligned Rods In Mode 1

__ **19 Record the following in the Control Room Log:**

- Misaligned rod position (DRPI).
- Affected bank position (Demand and DRPI)

__ **20 Position ROD BANK SELECTOR SWITCH to affected bank.**

__ **21 Determine if it is desirable to position the Misaligned Rod to Affected Bank position.**

22 Go to step 31 to position the Affected Bank to the Misaligned Rod.

22 IF not already in progress, THEN commence FNP-1-STP-37.0, POWER DISTRIBUTION SURVEILLANCE.

__ **23 Disconnect all lift coils in the affected bank except for the misaligned Rod.**

NOTE: ROD CONTROL SYS URGENT FAILURE alarm will annunciate when movement of misaligned Rod is initiated.

Per NMP-OS 001, REACTIVITY MANAGEMENT PROGRAM, the 3 step rod withdrawal limitation may be suspended during misaligned rod retrieval.

Rod withdrawal should be limited to 1 to 4 steps per minute and should not exceed 20 steps over a period of five minutes.

__ **24 Withdraw or insert the misaligned Rod in Bank Select, per the recommended rod withdrawal rate to align with current bank DRPI position.**

24 IF the misaligned Rod fails to move, THEN perform the following:

24.1 Connect lift coils opened instep 23.

Step 24 continued on next page

__Page Completed

Step	Action/Expected Response	Response Not Obtained

Section 1.2

Misaligned Rods In Mode 1

24.2 Reset step counter(s) to value recorded in step 20.

24.3 Notify maintenance to determine cause and repair Rod control malfunction.

24.4 Determine if misaligned rod is trippable:

24.4.1 IF rod control system malfunction is preventing rod motion, THEN misaligned rod is considered trippable.

24.4.2 IF rod control system is properly demanding motion and no motion occurs, THEN misaligned rod is considered untrippable.

24.5 IF misaligned Rod determined to be trippable, THEN go to step 25 after repairs are complete.

24.6 IF misaligned Rod determined to be untrippable, THEN:

24.6.1 Be in HOT STANDBY in 6 hours. (TS 3.1.4)

24.6.2 Go To FNP-1-UOP-3.1, POWER OPERATION.

__Page Completed

Step	Action/Expected Response	Response Not Obtained

Section 1.2

Misaligned Rods In Mode 1

__ 25 **Record the following in the Control Room Log.**

- Recovery completion time.
- Affected Bank position.

__ 26 **Connect the lift coil(s) opened in Step 23.**

__ 27 **Reset Rod Control Urgent Failure alarm.**

27.1 Depress ROD CONTROL URGENT FAILURE ALARM RESET pushbutton.

27.2 Verify ROD CONT SYS URGENT FAILURE annunciator FF1 – NOT LIT.

__ 28 **Reset the Master Cycler using FNP-1-SOP-41.0, CONTROL ROD DRIVE AND POSITION INDICATION SYSTEM.**

__ 29 **Reset the Step Counter to value recorded in Step 20.**

__Page Completed

Step	Action/Expected Response	Response Not Obtained

Section 1.2

Misaligned Rods In Mode 1

__ **30 Check IPC Rod Position should be updated.**

30.2 Update the IPC BANK POSITION DISPLAY to match the position recorded in step 14.

30.3 Check recovered rod Control Bank Rod.

30.2 Go to step 41 and exercise the affected bank per FNP-1-STP-5.0, FULL LENGTH CONTROL ROD OPERABILITY TEST

30.4 Go to step 41 and exercise the affected bank per FNP-1-STP-5.0, FULL LENGTH CONTROL ROD OPERABILITY TEST

__ 31 **Reset Rod Control Urgent Failure alarm.**

31.1 Depress ROD CONTROL URGENT FAILURE ALARM RESET pushbutton.

31.2 Verify ROD CONT SYS URGENT FAILURE annunciator FF1 – NOT LIT.

__ 32 **Reset the Master Cycler using FNP-1-SOP-41.0, CONTROL ROD DRIVE AND POSITION INDICATION SYSTEM.**

__Page Completed

Step	Action/Expected Response	Response Not Obtained

Section 1.2

Misaligned Rods In Mode 1

__ **33 Disconnect lift coil for misaligned Rod.**

****

CAUTION: Realigning the affected bank to the misaligned rod must be done without violating the bank sequence, overlap and insertion limits.

****

__ **34 Review the following:**

- TS 3.1.5
- TS 3.1.6

NOTE: Per NMP-OS 001, REACTIVITY MANAGEMENT PROGRAM, the 3 step rod withdrawal limitation may be suspended during misaligned rod retrieval.

__ **35 Position ROD BANK SELECTOR SWITCH in MANUAL.**

__ **36 Withdraw or insert the affected bank to the misaligned Rod DRPI position recorded in step 20.**

__ **37 Record the following in the Control Room Log.**

- Recovery completion time.
- Affected Bank position.

__Page Completed

Step	Action/Expected Response	Response Not Obtained

Section 1.2

Misaligned Rods In Mode 1

__ **38 Connect the lift coil for the misaligned Rod.**

__ **39 Verify affected bank step counter readings are at the misaligned Rod DRPI position recorded in step 20.**

__ **40 Check if Bank Overlap Unit should be reset:**

40.2 Check if affected bank position was less than All Rods Out position during the event.

40.1 Go to step 41.

40.3 Record control bank position in the Control Room Log.

40.4 Reset the Bank Overlap Unit Counter using FNP-1-SOP-41.0, CONTROL ROD DRIVE AND POSITION INDICATION SYSTEM.

__ **41 Exercise the affected bank using FNP-1-STP-5.0, FULL LENGTH CONTROL ROD OPERABILITY TEST.**

41 IF the Rod misaligns again, THEN return to Step 1.

__ **42 Place ROD BANK SELECTOR SWITCH in MAN or AUTO, as desired.**

__ **43 Perform the following:**

43.2 Notify Duty Engineer of misaligned Rod recovery.

43.3 Notify Duty Engineer that plant computer Rod position adjustment may be necessary.

__Page Completed

Step	Action/Expected Response	Response Not Obtained

Section 1.2

Misaligned Rods In Mode 1

__ **44** **After rod recovery wait 15 hours at reduced power level prior to power ascension.**

__ **45** **Power Ascension shall be in accordance with FNP-1-UOP-3.1, APPENDIX 1, SPECIAL LOAD RATE LIMITATIONS.**

__ **46** **Return to procedure in effect.**

-END-

__Page Completed

Step	Action/Expected Response	Response Not Obtained

Section 1.3

Dropped Rods In Mode 1

NOTE: A Rod misaligned greater than 45 steps should be considered "dropped" and this section performed.

__ **1 Stop any turbine loading changes.**

__ **2 Check the following:**

- DRPI - AVAILABLE.
- Only one Rod dropped by observing DRPI.

2 Perform the following:

2.1 Trip the Reactor.

2.2 Go to FNP-1-EEP-0, REACTOR TRIP OR SAFETY INJECTION

__ **3 Check rod misaligned greater than 45 steps.**

3 Go to Section 1.2, Misaligned Rods in Mode 1.

__ **4 Initiate TS 3.1.4.**

__ **5 Maintain Tavg at program by performing the following as appropriate:**

- Adjust Turbine load.
- Dilute or borate.
- Use manual Rod control.

__Page Completed

Step	Action/Expected Response	Response Not Obtained

Section 1.3

Dropped Rods In Mode 1

__ **6 Maintain power distribution when greater than or equal to 50% power:**

6.1	AFD - WITHIN LIMITS SPECIFIED IN THE COLR.	6.1 Reduce power until one of the following are met: • AFD within plus or minus 5% of target. OR • Reactor power less than 50%.
6.2	QPTR - LESS THAN OR EQUAL TO 1.02.	6.2 Initiate TS 3.2.4.

__ **7 Perform the following:**

7.1 Initiate action to determine cause and repair Rod Control malfunction.

7.2 With Maintenance's concurrence disconnect lift coil for the dropped rod.

__ **8 Record the following in the Unit Control Log.**

- Record the following in the Unit Control Log.
- Dropped Rod number.
- Initial Power Level.
- Affected group step counter position.

__Page Completed

Step	Action/Expected Response	Response Not Obtained

Section 1.3

Dropped Rods In Mode 1

__	9	**Check Annunciator FC3, PR Hi Flux Rate Alert is clear.** • TSLB-2 NI Hi rate bistables not illuminated.	9 On the affected PR NI Drawer, reset the Positive Rate Trip as follows: 9.1 Turn the RATE MODE Switch momentarily to RESET. 9.2 Verify POSITIVE RATE TRIP Drawer Light is NOT lit. 9.3 Check PR HI RATE bistable not illuminated on TSLB-2 • 12.1 – PR HI Q RATE NC 41U • 12.2 – PR HI Q RATE NC 42U • 12.3 – PR HI Q RATE NC 43U • 12.4 – PR HI Q RATE NC 44U

__Page Completed

Step	Action/Expected Response	Response Not Obtained

Section 1.3

Dropped Rods In Mode 1

NOTE: Power reduction as soon as practical after the rod drop occurs minimizes local fuel power distribution variances and the chances of fuel damage. Although TS 3.1.4 requires power be reduced to less that 75% within 2 hours, a target of achieving reactor power level less than 75% in one hour meets the "as soon as practical" objective.

__ **10 Reduce Thermal Power to less than 75% within 1 hour from time of Rod drop using FNP-1-UOP-3.1, POWER OPERATION.**

__ **11 Check fuel preconditioned power level greater than or equal to 90% per Reactor Engineering.**

11.1 Continue power reduction to less than 50% RTP as soon as possible.

11 Continue power reduction to the greater of the following:

- 40% RTP below the fuel's preconditioned power level.

-OR-

- 30% RTP.

__ **12 Check if rod retrieval should be initiated:**

12.1 Time of dropped rod known.

12.1 Commence a Unit shutdown to Mode 3 per FNP-1-UOP-3.1, POWER OPERATION.

12.2 Direct cause of dropped rod known and corrective action taken.

12.2 Perform the following:

12.2.1 Consult Reactor Engineering and Operations Management.

Step 12 continued on next page.

__Page Completed

Step	Action/Expected Response	Response Not Obtained

Section 1.3

Dropped Rods In Mode 1

12.2.2 Do not continue until one of the following is satisfied:

a) IF recovery plan developed to retrieve dropped rod,
THEN continue with Step 13.

-OR-

b) IF decision made to initiate a unit shutdown,
THEN go to FNP-1-UOP-3.1, POWER OPERATION.

__ **13 [CA]Maintain reduced power level until rod recovery initiated.**

__ **14 Rod to be recovered within 120 hours of initial misalignment.**

14 Notify Nuclear Fuels to determine impact on Safety Analysis and recovery effort.

14.1 IF Safety Analysis cannot be confirmed within 120 hours,
THEN go to FNP-1-UOP-3.1, POWER OPERATION and initiate a unit shutdown to Mode 3.

__ **15 [CA]Maintain Tavg within 3°F of Tref during recovery.**

__Page Completed

Step	Action/Expected Response	Response Not Obtained

Section 1.3

Dropped Rods In Mode 1

__ **16 [CA]Maintain reduced power level during recovery:**

- IF fuel conditioned greater than or equal to 90%, THEN Maintain Reactor Power less than 50%.
- IF fuel conditioned greater 70% but less than 90%, THEN Maintain Less than or equal to 40% RTP below the fuel's preconditioned power level.
- IF fuel conditioned less than 70%, THEN Maintain less than or equal to 30% RTP.

__ **17 Position the Rod Bank Selector Switch to the affected bank.**

__ **18 Reset the affected group step counter to zero.**

__ **19 Connect Lift Coil for dropped rod, if previously disconnected.**

__ **20 IF not already in progress, THEN commence FNP-1-STP-37.0, POWER DISTRIBUTION SURVEILLANCE.**

__ **21 Disconnect all lift coils in the affected bank except for the dropped Rod.**

NOTE: ROD CONTROL SYS URGENT FAILURE alarm will annunciate when movement of misaligned Rod is initiated.

Per NMP-OS 001, REACTIVITY MANAGEMENT PROGRAM, the 3 step rod withdrawal limitation may be suspended during misaligned rod retrieval.

__ **22 Record the affected bank's group step counters positions in the Unit Control Log.**

__Page Completed

Step	Action/Expected Response	Response Not Obtained

Section 1.3

Dropped Rods In Mode 1

NOTE: Per NMP-OS 001, REACTIVITY MANAGEMENT PROGRAM, the 3 step rod withdrawal limitation may be suspended during misaligned rod retrieval.

__ **23 Withdraw the Rod in Bank Select to the affected bank's current position.**

22 IF the Rod fails to move, THEN:

22.1 Connect Lift Coils opened in Step 20.

22.2 Reset the Step Counter to value recorded in Step 21.

22.3 Continue applicable actions of T.S. 3.1.4.

22.4 Reset Rod Control Urgent Failure alarm.

22.4.1 Depress ROD CONTROL URGENT FAILURE ALARM RESET pushbutton.

22.4.2 Verify ROD CONT SYS URGENT FAILURE annunciator FF1 – NOT LIT.

22.5 Place Rod Bank Selector Switch in MAN.

22.6 Return to Step 12.

__ **24 Record the following in the Unit Control Log:**

24.1 Recovery completion time.

24.2 Affected Bank Position.

__ **25 Connect Lift Coils opened in Step 20.**

__Page Completed

Step	Action/Expected Response	Response Not Obtained

Section 1.3

Dropped Rods In Mode 1

__ 25 **Reset Rod Control Urgent Failure alarm.**

25.1 Depress ROD CONTROL URGENT FAILURE ALARM RESET pushbutton.

25.2 Verify ROD CONT SYS URGENT FAILURE annunciator FF1 – NOT LIT.

__ 26 **Reset the Master Cycler using FNP-1-SOP-41.0, CONTROL ROD DRIVE AND POSITION INDICATION SYSTEM.**

__ 27 **Reset the IPC Rod Bank Positions per FNP-1-SOP-41.0, CONTROL ROD DRIVE AND POSITION INDICATION SYSTEM.**

__ 28 **Check annunciator FF5, COMP ALARM ROD SEQ/DEV OR PR FLUX TILT clear.**

__ 29 **Stop performance of FNP-1-STP-37.0, POWER DISTRIBUTION SURVEILLANCE.**

NOTE: If possible, Maintenance should observe Rod exercise to determine required corrective actions.

__ 30 **Exercise the affected bank using FNP-1-STP-5.0, FULL LENGTH CONTROL ROD OPERABILITY TEST.**

__ 31 **Place ROD BANK SELECTOR SWITCH in MAN or AUTO position, as desired.**

__Page Completed

Step	Action/Expected Response	Response Not Obtained

Section 1.3

Dropped Rods In Mode 1

__ 32 **After rod recovery wait 15 hours at reduced power level prior to power ascension.**

__ 33 **Power Ascension shall be in accordance with FNP-1-UOP-3.1, APPENDIX 1, SPECIAL LOAD RATE LIMITATIONS.**

__ **32 Perform the following:**

32.1 Notify Duty Engineer of Rod drop recovery.

__ **33 Return to procedure and step in effect.**

-END-

__Page Completed

Step	Action/Expected Response	Response Not Obtained

Section 1.4

Dropped OR Misaligned Rods In Modes 2 through 5

__ 1 **Check if Reactor shutdown is required:**

1.1 Check one or more rods DROPPED:

1.1.1 IF in Modes 2 or 3, THEN perform one of the following:

- Go To FNP-1-UOP-2.1, REACTOR SHUTDOWN TO HOT STANDBY, and perform a normal reactor shutdown.

OR

- Trip the reactor and Go To FNP-1-EEP-0, REACTOR TRIP OR SAFETY INJECTION.

1.1.2 IF in Modes 4 or 5,THEN perform one of the following:

- Insert Control Rods

OR

- Open Reactor Trip Breakers

Step 1 continued on next page.

__Page Completed

Step	Action/Expected Response	Response Not Obtained

Section 1.4

Dropped OR Misaligned Rods In Modes 2 through 5

1.2 Check one or more rods MISALIGNED:

1.2.1 IF in Modes 2 or 3, THEN perform one of the following:

- Go To FNP-1-UOP-2.1, REACTOR SHUTDOWN TO HOT STANDBY, and perform a normal reactor shutdown.

OR

- Trip the reactor and Go To FNP-1-EEP-0, REACTOR TRIP OR SAFETY INJECTION.

1.2.2 IF in Modes 4 or 5, THEN perform one of the following:

- Insert Control Rods

OR

- Open Reactor Trip Breakers

__ 2 **Initiate repairs of Rod Control System.**

__ 3 **Go to the applicable UOP.**

-END-

__Page Completed

jpm h

CRO-039A

TITLE: Adjust Setpoints Of The N-16 Primary To Secondary Leak Detection System

PROGRAM APPLICABLE: SOIT ___ SOCT ___ HLT _X_ LOCT ___

ACCEPTABLE EVALUATION METHOD: _X_ PERFORM ___ SIMULATE ___ DISCUSS

EVALUATION LOCATION: _X_ SIMULATOR ___ CONTROL ROOM ___ PLANT

PROJECTED TIME: _5 MIN_ SIMULATOR IC NUMBER: _IC-218 (Base – 125)_

ALTERNATE PATH ___ TIME CRITICAL ___ PRA

JPM DIRECTIONS:

1. Examinee will obtain all references from the simulator.
2. The actions of this task are intended to be performed on an Active Simulator in which the examinee may diagnose the correctness of system response to his/her actions and respond to any abnormal conditions which may arise.
3. Provide student with HANDOUT.
4. Allow student time to review control board.
5. Instructor will be provided to address alarms not related to evaluated task.

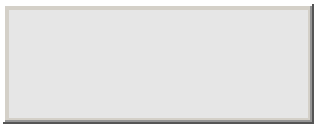
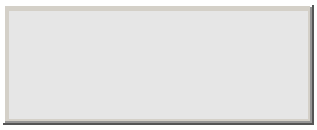
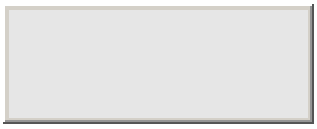
TASK STANDARD: Upon successful completion of this JPM, the examinee will:

1. Adjust Setpoints Of The N-16 Primary To Secondary Leak Detection System.

Examinee:	
Overall JPM Performance:	**Satisfactory** ☐ **Unsatisfactory** ☐
Evaluator Comments (attach additional sheets if necessary)	

EXAMINER: _____

Developer	S Jackson	Date: 4/8/15
NRC Approval	SEE NUREG 1021 FORM ES-301-3	

EVENT DESCRIPTION	ACTION	DETAILS
Reset into IC-218		
Acknowledge computer alarms		
Freeze Xe		
Run / Freeze Simulator		
Acknowledge Alarms		
Clear Ovation alarms		
Turn Horns ON		
Run / Freeze Simulator		
Unfreeze Xe		
Run / Freeze Simulator		

CONDITIONS

When I tell you to begin, you are to **ADJUST SETPOINTS OF THE N-16 PRIMARY TO SECONDARY LEAK DETECTION SYSTEM.** The conditions under which this task is to be performed are:

a. The unit is in Mode 1 at 100% power.
b. The control room team has entered AOP-2.0 due to an excessive RCS leak rate along with R-19 coming into alarm, indicating a primary to secondary leak.
c. R-70B has exceeded the Alert setpoint and is currently indicating ~ 48 gpd.
d. You are directed by the Shift Supervisor to raise the R-70B Alert setpoint to 75 gpd per SOP-69.0.

EVALUATION CHECKLIST

	ELEMENTS:	**STANDARDS:**	**RESULTS: (CIRCLE)**
	____ START TIME		
	Note: The below steps are from Section 4.3 Changing Alarm Setpoints.		
*1.	1 Press the CODE key.	Observes display: COD ?	S / U
*2.	2 Enter 1111.	Enters 1111. Observes display: 1111	S / U
*3.	3 Press the VAL key.	VAL key depressed. Observes display: 48 gpd	S / U
*4.	4 Press ALRT, H, or H/H key, depending on setpoint to be changed.	ALRT key depressed. Observes display: 5.0+0.	S / U
5.	5 Check existing setpoint displayed.	Observes display: 5.0+0.	S / U
*6.	6 Press the MOD key.	MOD key depressed. Observes display: 5.0+0 with the 5 flashing.	S / U

NOTE: VALUES ARE CHANGED IN THE FOLLOWING STEP BY MOVING THE CURSOR WITH THE ARROW KEYS AND REPLACING THE CURRENT VALUE WITH A NEW ONE. THE TRAINEE MAY HAVE TO TRY MORE THAN ONCE TO LEARN HOW THE KEYPAD WORKS.

*7.	7 Using arrow (↑, ↓, →, ←) keys to move cursor, enter desired setpoint (gallons per day) using numeric keys.	7.5+1 entered. Observes display: 7.5+1.	S / U
*8.	8 WHEN desired setpoint is displayed, press VAL key.	VAL key depressed. Observes display: 7.5+1 and the MCB alarm clears.	S / U
*9.	9 Press the MEAS key to return to the measurement mode.	MEAS key depressed. Observes display: 48 gpd.	S / U
10.	10 Check display indicates 'AV' and leak rate.	Observes display: AV	S / U
11.	11 Press ALRT, H, or H/H key, depending on the setpoint changed.	ALRT depressed. Observes display: 7.5+1.	S / U
12.	12 Check setpoint was changed to correct, desired value.	Observes display: 7.5+1.	S / U
13.	13 Press MEAS key to return to measurement mode.	MEAS depressed. Observes display: 48 gpd.	S / U

_____ STOP TIME

Terminate JPM when all elements of the task have been completed.

CRITICAL ELEMENTS: Critical Elements are denoted with an asterisk (*) before the element number.

GENERAL REFERENCES

1. FNP-1-SOP-69.0, ver 6.0
2. KA: 073A4.02 – 3.7 / 3.7

GENERAL TOOLS AND EQUIPMENT

1. FNP-1-SOP-69.0, ver 6.0

Critical ELEMENT justification:

1-4	Critical – Task completion.
5	Not critical – Check step.
6-9	Critical – Task completion.
10-13	Not critical – Check steps.

COMMENTS

jpm h

CONDITIONS

When I tell you to begin, you are to **ADJUST SETPOINTS OF THE N-16 PRIMARY TO SECONDARY LEAK DETECTION SYSTEM.** The conditions under which this task is to be performed are:

a. The unit is in Mode 1 at 100% power.
b. The control room team has entered AOP-2.0 due to an excessive RCS leak rate along with R-19 coming into alarm, indicating a primary to secondary leak.
c. R-70B has exceeded the Alert setpoint and is currently indicating ~ 48 gpd.
d. You are directed by the Shift Supervisor to raise the R-70B Alert setpoint to 75 gpd per SOP-69.0.

SOUTHERN COMPANY

FARLEY
Unit 1

SAFETY RELATED

FNP-1-SOP-69.0

N-16 Primary To Secondary Leak Detection System

VERSION 6.0

Special Considerations:

This is an upgraded procedure. Exercise increased awareness during initial use due to potential technical and/or sequential changes. After initial use, provide comments to the procedure upgrade team.

PROCEDURE LEVEL OF USE CLASSIFICATION PER NMP-AP-003	
CATEGORY	**SECTIONS**
Continuous	**ALL**
Reference	**NONE**
Information	**NONE**

Approval: David L Reed (Approved By) 11/27/13 (Date)

Effective Date:

OPERATIONS
Responsible Department

VERSION SUMMARY
PVR 6.0 DESCRIPTION
Updated to fleet template and latest writer's guide

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1.0 PURPOSE

To provide guidance for operation of the Primary to Secondary Leak Detection System.

2.0 PRECAUTIONS AND LIMITATIONS

1. The system receives a reactor power input from power range channel N-43. IF N-43 fails OR is in Test OR is less than 20% power, the system cannot accurately estimate a leak rate in the AV mode, and the indicators will display "PN <20%". IF desired, the Counting Room can configure the N-16 system in the ME counts per second (C/S) mode using FNP-0-CCP-31, Leak Rate Determination. While not able to provide a leak rate determination, this mode can be used to indicate if leakage is increasing based on the indication trending up. The AV mode is the preferred mode of operation above 20% Reactor Power. The ME mode should only be utilized below 20% Reactor Power. ☐

2. The N-16 Leak Detection System cannot determine the location of a leak within a specific Steam Generator. The system can however provide a more accurate leak rate determination if the location of the leak is known to be in one of the following locations:

   - Cold Leg - CB
   - Hot Leg - HB
   - U-Bend region - BE

   WHEN a leak location is selected (CB, HB or BE), the processor displays a leak rate that assumes the leak is at the location you have selected. The AV mode is essentially the average of the three leak rates at the specific locations. ☐

3. The N-16 system is limited to an upward range of 1,000 gallons per day. ☐

4. The MCB annunciator alarms when any channel reaches its ALERT setpoint. To clear the annunciator and provide warning of an increasing leak rate, the alert setpoint may be raised using Section 4.3. ☐

5. The ALERT setpoint cannot be set above the HIGH setpoint. IF an ALERT setpoint greater than the existing HIGH setpoint is needed, the HIGH setpoint must be raised. ☐

6. This procedure may contain previously evaluated Critical Steps that may not be applicable in certain plant conditions. The evaluation of this procedure for Critical Steps is performed during the Pre-Job briefing. The decision concerning how to address error precursors for critical steps should be governed by NMP-GM-005-GL03, Human Performance Tools. ☐

2.0 PRECAUTIONS AND LIMITATIONS (continued)

NOTE

Any numerical value set in the AV - gallons per day mode will carry over to the ME - counts per second mode. (i.e. an alert setting of 5 gpd in the AV mode will correspond to an alert setting of 5 counts per second in the ME mode). ☐

7. The normal alarm settings for N1D11RISH0070A, B & C are:

   - ALERT - 5 gpd
   - HIGH - 150 gpd
   - HIGH-HIGH - 300 gpd

   The existing setpoints may be checked by pressing the ALRT, H, and H/H keys as needed. ☐

8. Minor system faults are indicated by the OPER LED flashing. FNP-1-ARP-1.6, Main Control Board Annunciator Panel F, location FG2, contains corrective actions. ☐

9. A list of system abbreviations is contained in Table 1. ☐

3.0 INITIAL CONDITIONS

1. 120V Regulated Instrumentation Panel 1B is ENERGIZED per FNP-1-SOP-36.4, 120V A.C. Distribution Systems. ☐

4.0 INSTRUCTIONS

4.1 System Startup:

1. **Close** N1R22L001B-N-BKR9, N-16 PRI TO SEC LEAK DETECTION SYS ANAL CAB (R-70) in 120V Regulated A.C. Instrumentation Panel 1B, N1R22L001B-N (121' 1B Battery Charger Room). ☐

2. In CONTROL PANEL FOR STEAM GENERATOR N16 LEAK DETECTION SYSTEM, N1H21NFSGL2631-N (121' Rod Control Room) [key C415A], **close** the three circuit breakers in the following panels:

   - (A)-CR191 ☐
   - (B)-CR191 ☐
   - (C)-CR191 ☐

4.1 System Startup: (continued)

3. On the following indicating modules, **press** ON/OFF pushbuttons to energize modules.

   - N1D11RISH0070A ☐
   - N1D11RISH0070B ☐
   - N1D11RISH0070C ☐

NOTES

- Changes between the AV and ME modes of operation is performed by the Counting Room technician using the guidance of FNP-0-CCP-31, Leak Rate Determination, Appendix B, N-16 System. ☐
- AV / gallons per day mode is the preferred mode of operation above 20% Reactor Power. ME / counts per second (C/S) mode does not indicate a leak rate, but is useful for trending changes in leak rate below 20% power. It is possible to indicate ME gallons per day (GPD), however this is misleading. While GPD units may be indicated, the value is actually representing counts per second. IF indicating 'ME ---- GPD', the Counting Room technician should be requested to change the display to C/S. ☐

4. **Check** that all three indicating modules initialize and provide a display as follows:

   a. IF Reactor Power is greater than or equal to 20%, **check** each display indicates '**AV ---- GPD':**

      - N1D11RISH0070A ☐
      - N1D11RISH0070B ☐
      - N1D11RISH0070C ☐

   b. IF Reactor Power is less than 20%, **check** each display indicates '**AV PN <20%** ' OR , '**ME ---- C/S** '

      - N1D11RISH0070A ☐
      - N1D11RISH0070B ☐
      - N1D11RISH0070C ☐

4.2 System Shutdown

1. On the following indicating modules, **press** ON/OFF pushbuttons to de-energize the modules.
   - N1D11RISH0070A ☐
   - N1D11RISH0070B ☐
   - N1D11RISH0070C ☐
2. In CONTROL PANEL FOR STEAM GENERATOR N16 LEAK DETECTION SYSTEM, N1H21NFSGL2631-N (121' Rod Control Room) [key C415A], **open** the three circuit breakers in the following panels:
   - (A)-CR191 ☐
   - (B)-CR191 ☐
   - (C)-CR191 ☐
3. **Open** N1R22L001B-N-BKR9, N-16 PRI TO SEC LEAK DETECTION SYS ANAL CAB (R-70) in 120V Regulated A.C. Instrumentation Panel 1B, N1R22L001B-N (121' 1B Battery Charger Room). ☐

4.3 Changing Alarm Setpoints

1. **Press** CODE key. ☐

NOTE

IF the wrong value is entered in Step 2, pressing the VAL key and returning to Step 1 will allow the correct value to be entered. ☐

2. **Enter** 1111. ☐
3. **Press** VAL key. ☐

NOTE

The alarm setpoints are displayed in scientific notation in gallons per day (gpd).
For example: 1.5 + 2 displayed = 1.5×10^2 = 150 gpd. ☐

4. **Press** ALRT, H, or H/H key, depending on setpoint to be changed. ☐
5. **Check** existing setpoint displayed. ☐
6. **Press** MOD key. ☐
7. Using arrow (↑, ↓, →, ←) keys to move cursor, **enter** desired setpoint (gallons per day) using numeric keys. ☐

4.3 Changing Alarm Setpoints (continued)

8. WHEN desired setpoint is displayed, **press** VAL key. ☐
9. **Press** MEAS key to return to measurement mode. ☐
10. **Check** display indicates 'AV' and leak rate. ☐
11. **Press** ALRT, H, or H/H key, depending on the setpoint changed. ☐
12. **Check** setpoint was changed to correct, desired value. ☐
13. **Press** MEAS key to return to measurement mode. ☐
14. IF a setpoint has been changed from NORMAL value listed in Section 2.0 Precaution and Limitation 7, **place** a Status tag stating new setpoint on channel modified. ☐

NOTE

The N-16 Leak Detection System cannot determine the location of a leak within a specific Steam Generator. The system can however, provide a more accurate leak rate determination if the location of the leak is known to be in one of the following locations:

Cold Leg - CB, Hot Leg - HB or U-Bend region - BE

WHEN a leak location is selected (CB, HB or BE), the processor displays a leak rate that assumes the leak is at the location you have selected. ☐

4.4 Determining Estimated Leak Based on Assumed Leak Location

1. **Press** CODE key. ☐
2. **Enter** 1111. ☐
3. **Press** VAL key. ☐
4. **Press** MEAS key. ☐
5. **Press** VAL key. ☐
6. **Press** MOD key. ☐
7. Using arrow (↑, ↓, →, ←) keys, **scroll** to desired leak location (CB, AV, BE, or HB). ☐
8. **Press** VAL key. ☐
9. IF desired to check another leak location, **repeat** Step 1 to Step 8. ☐
10. To return to the NORMAL operating mode (AV - gallons per day mode), **repeat** Step 1 to Step 8, selecting AV in Step 7. ☐

5.0 RECORDS

Documents created using this procedure will become QA Records when completed unless otherwise stated. The procedures and documents are considered complete when issued in DMS.

QA Record (X)	Non-QA Record (X)	Record Generated	Retention Time	R-Type
X		FNP-1-SOP-69.0	LP	HH6.051

6.0 REFERENCES

- PCN B88-1-5212, N-16 Primary to Secondary Leak Detection System.
- U-265894, N-16 USER MANUAL.
- D-175033, Sht. 1, P&ID Main Steam System.
- D-181594, Connection Diagram Analyzer Cabinet N1H21NFSGL2631-N.
- D-181706, Connection Diagram BOP Rack N1H11NGBOP2506Q-N.

TABLE 1
Page 1 of 1

List Of System Abbreviations

A, ALRT	-	Alert
ACC	-	Accumulation
ALG	-	Algorithm
AV	-	Averaging Mode (in gallons per day)
BE	-	U-Bend Break
C	-	Cancel
CB	-	Cold Leg Break (bottom)
COD,CODE	-	Code
C/S	-	Counts per Second
FLT	-	Fault
H	-	High
HB	-	Hot Leg Break (bottom)
H/H	-	High-High
IMP	-	Impulse (Pulse Count)
INIT	-	Initialize
ME	-	Counts per Second Mode (C/S)
MEAS	-	Measurement
MOD	-	Modify
OPER	-	Operate
PARAM	-	Parameters
PN	-	Reactor Power
SEL	-	Select
STA,STAT	-	Status
TEST	-	Test
UNI	-	Units
VAL	-	Validate
+ –	-	Change Exponent Sign
↑	-	Scroll Up
↓	-	Scroll Down
→	-	Scroll Right
←	-	Scroll Left

jpm i.

SO-607A

TITLE: Perform the Required Actions to Minimize DC Loads

PROGRAM APPLICABLE: SOT ___ SOCT ___ OLT __X__ LOCT _

ACCEPTABLE EVALUATION METHOD: ___ PERFORM __X__ SIMULATE ____ DISCUSS

EVALUATION LOCATION: ____ SIMULATOR ____ CONTROL ROOM __X__ PLANT

PROJECTED TIME: __12 MIN.__ SIMULATOR IC NUMBER: __N/A

ALTERNATE PATH ____ TIME CRITICAL ____ PRA _____

JPM DIRECTIONS:

1. All actions will be **SIMULATED.**
2. This JPM to be performed on UNIT 1 ONLY.
3. Provide student HANDOUT and procedure.
4. Allow student time to review conditions and procedure.

TASK STANDARD:

1. Perfom the action to minimize DC loads.

Examinee:		
Overall JPM Performance:	**Satisfactory** ☐	**Unsatisfactory** ☐
Evaluator Comments (attach additional sheets if necessary)		

EXAMINER: _____

Developer	S. Jackson	Date: 4/6/15
NRC Approval	SEE NUREG 1021 FORM ES-301-3	

CONDITIONS

When I tell you to begin, you are to PERFORM THE REQUIRED ACTIONS TO MINIMIZE DC LOADS. The conditions under which this task is to be performed are:

a. A loss of all AC power has occurred on UNIT 1.
b. ECP-0.0 is in progress.
c. You are directed by the control room to de-energize non-essential DC loads in the non-rad side of the auxiliary building using Attachment 4 of ECP-0.0.
d. A pre-job brief is not required.

EVALUATION CHECKLIST

	ELEMENTS:	**STANDARDS:**	**RESULTS: (CIRCLE)**
	____ START TIME		
*1.	1 Deenergize non-essential DC loads in the NON-RAD AUX BLDG. 1.1 Open breaker for non-essential load on 1A 125V DC distr panel (155 ft AUX BLDG main control room) Load Control Remote Unit Control Power To Fuse Block NSH11NGLCR2507I-N [] BKR 25	Breaker 25 taken to the OFF position. (CUE: For each breaker operated the breaker indicates as you described.)	S / U
*2.	1.2 Open breakers for non-essential load on 1B 125V DC distr panel (139 ft. AUX BLDG A train SWGR room). CRDM MG "1A" Control Cab Power to Starter Bkr., Field Flash & output CT [] BKR 9 Rx Trip SWGR Control Power to Unit 1 "A" Bypass Bkr & "A" Rx Trip Bkr [] BKR 16	Breakers 9 and 16 taken to the OFF position. (CUE: For each breaker operated the breaker indicates as you described.)	S / U

EVALUATION CHECKLIST

ELEMENTS:	STANDARDS:	RESULTS: (CIRCLE)
*3. 1.3 Open breakers for non-essential load on 1H 125V DC distr panel (139 ft. AUX BLDG CDRM MG set room). Solenoid Valve 600 Volt Load Center Dampers LCS [] BKR 7 Radioactive Lab Exh Fan SV/JB NSV46V3860-N/JB [] BKR 10 Waste Evaporator Control Panel N1G21NDWE2609-N [] BKR 13 Recycle Evaporator Control Panel N1G21NDRE2608-N [] BKR 16 Steam Generator Blowdown Processing Panel N1G24NDSGB2611-N [] BKR 20	Breakers 7, 10, 13, 16, and 20. taken to the OFF position. (CUE: For each breaker operated the breaker indicates as you described.)	S / U
*4. 1.4 Open breakers for non-essential load on 1G 125V DC distr panel (139 ft. AUX BLDG CDRM SWGR room). Waste Encap. Panel N1G24NGWBP2614-N [] BKR 15 Containment Cooler Vibration Switches [] BKR 16 Lower Equip Room HVAC Local Control Station N1V47L003-N [] BKR 17	Breakers 15, 16, and 17 taken to the OFF position. (CUE: For each breaker operated the breaker indicates as you described.)	S / U

EVALUATION CHECKLIST

ELEMENTS:	STANDARDS:	RESULTS: (CIRCLE)
*5. 1.5 Open breakers for non-essential load on 1E 125V DC distr panel (121 ft. AUX BLDG B train SWGR room). CRDM MG Set 1B control cabinet [] BKR 9 Rx Trip SWGR Cabinet Unit 1 Q1C11E004A-AB [] BKR 16	Breakers 9 and 16 taken to the OFF position. (CUE: For each breaker operated the breaker indicates as you described.)	S / U

____ UNIT 1 STOP TIME

Terminate when DC breakers at distribution panel 1E are opened.

*** CRITICAL ELEMENTS: Critical Elements are denoted with as Asterisk (*) preceding the element number.**

GENERAL REFERENCES:

1. FNP-1-ECP-0.0, Attachment 4, ver 27
2. K/As: 055EA1.04 - 3.5 / 3.9

GENERAL TOOLS AND EQUIPMENT:

Provide either:

FNP-1-ECP-0.0, Attachment 4, Rev. 26
FNP-2-ECP-0.0, Attachment 4, Rev. 26

Critical ELEMENT justification:	
1-5	Critical – Task completion. DC loads must be reduced to extend battery life to permit monitoring and control of the plant until AC is restored.

COMMENTS:

jpm i

CONDITIONS

When I tell you to begin, you are to PERFORM THE REQUIRED ACTIONS TO MINIMIZE DC LOADS. The conditions under which this task is to be performed are:

a. A loss of all AC power has occurred on UNIT 1.
b. ECP-0.0 is in progress.
c. You are directed by the control room to de-energize non-essential DC loads in the non-rad side of the auxiliary building using Attachment 4 of ECP-0.0.
d. A pre-job brief is not required.

Step	Action/Expected Response	Response NOT Obtained

ATTACHMENT 4

NOTE: Steps 1 and 2 may be performed in any order.

___ 1 **Deenergize non-essential DC loads in the NON-RAD AUX BLDG.**

1.1 Open breaker for non-essential load on 1A 125 V DC distribution panel. (155 ft, AUX BLDG main control room)

Load Control Remote
Unit Control Power
To Fuse Block
NSH11NGLCR2507I-N
[] BKR 25

1.2 Open breakers for non-essential loads on 1B 125 V DC distribution panel. (139 ft, AUX BLDG A train SWGR room)

CRDM MG "1A" Control
Cab Power to Starter
Bkr., Field Flash &
output CT
[] BKR 9

Rx Trip SWGR Control
Power to Unit 1
"A" Bypass Bkr &
"A" Rx Trip Bkr
[] BKR 16

Step 1 continued on next page.

Step	Action/Expected Response	Response NOT Obtained

ATTACHMENT 4

1.3 Open breakers for non-essential loads on 1H 125 V DC distribution panel. (139 ft, AUX BLDG CRDM MG set room)

Solenoid Valve 600 Volt
Load Center Dampers LCS
[] BKR 7

Radioactive Lab
Exh Fan SV/JB
NSV46V3860-N/JB
[] BKR 10

Waste Evaporator
Control Panel
N1G21NDWE2609-N
[] BKR 13

Recycle Evaporator
Control Panel
N1G21NDRE2608-N
[] BKR 16

Steam Generator Blowdown
Processing Panel
N1G24NDSGB2611-N
[] BKR 20

Step 1 continued on next page.

Step	Action/Expected Response	Response NOT Obtained

ATTACHMENT 4

1.4 Open breakers for non-essential loads on 1G 125 V DC distribution panel. (139 ft, AUX BLDG CRDM SWGR room)

Waste Encap.
Panel
N1G24NGWBP2614-N
[] BKR 15

Containment Cooler Vibration Switches
[] BKR 16

Lower Equip Room
HVAC Local Control Station
N1V47L003-N
[] BKR 17

1.5 Open breakers for non-essential loads on 1E 125 V DC distribution panel. (121 ft, AUX BLDG B train SWGR room)

CRDM MG Set 1B
control cabinet
[] BKR 9

Rx Trip SWGR Cabinet
Unit 1 Q1C11E004A-AB
[] BKR 16

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DF03
ED04
LA08
1A 125V DC DIST PNL AB-155' D177082

BKR	TPNS	DESCRIPTION	SEE PAGE
	Q1R41L0001A-A	**1A 125V DC DISTRIBUTION PANEL <<< LA08**	
1A-01	Q1R45G0002A-A	NO. 1 EMERGENCY LIGHTING RELAY BOX FEEDER (CONTROL ROOM)	
1A-02	Q1R45G0002A-A	NO. 2 EMERGENCY LIGHTING RELAY BOX FEEDER (CONTROL ROOM)	
1A-03	Q1R45G0002A-A	NO. 3 EMERGENCY LIGHTING RELAY BOX FEEDER (CONTROL ROOM)	
1A-04	----------	SPARE	
1A-05	----------	SPARE	
1A-06	**Q1H25L0009-A**	**9A TERMINATION CABINET PANEL 1 FRONT >>>**	**F-6**
1A-07	**N1H11NGAR2506F-N**	**#1 AUXILIARY RELAY RACK TRAIN "A" >>>**	**F-7**
1A-08	**QSH11NGEPB2508-AB**	**EMERGENCY POWER BOARD (VIA EPB ANNUN UNIT 1/UNIT 2 PWR TRANS SW QSH11S0001A-A) >>>**	**F-8**
	Q1H25L036-A	**36A TERMINATION CABINET PANEL 3 REAR (VIA EPB ANNUN UNIT 1/UNIT 2 PWR TRANS SW QSH11S0001A-A) >>>**	**F-9**
1A-09	**Q1H25L0004-A**	**4A TERMINATION CABINET PANEL 1 FRONT >>>**	**F-10**
1A-10	**Q1H25L0004-A**	**4A TERMINATION CABINET PANEL 2 FRONT >>>**	**F-11**
1A-11	**Q1H25L0005-A**	**5A TERMINATION CABINET PANEL 3 REAR >>>**	**F-12**
	Q1H25L0005-A	**5A TERMINATION CABINET PANEL 4 REAR >>>**	**F-13**
1A-12	**Q1H25L0008-A**	**8A TERMINATION CABINET PANEL 1 FRONT >>>**	**F-14**
1A-13	**Q1H25L0008-A**	**8A TERMINATION CABINET PANEL 3 REAR >>>**	**F-15**
1A-14	**Q1H25L0008-A**	**8A TERMINATION CABINET PANEL 4 REAR >>>**	**F-16**

DF03
ED04
LA08
1A 125V DC DIST PNL AB-155' D177082
(CONT'D)

BKR	TPNS	DESCRIPTION	SEE PAGE
1A-15	Q1H25L0010-A	10A TERMINATION CABINET PANEL 1 FRONT >>>	F-17
1A-16	Q1H25L0010-A	10A TERMINATION CABINET PANEL 2 FRONT >>>	F-18
	Q1H25L0010-A	10A TERMINATION CABINET PANEL 4 REAR >>>	F-19
1A-17	Q1H25L0006-A	6A TERMINATION CABINET PANEL 2 FRONT >>>	F-20
1A-18	Q1H25L0006-A	6A TERMINATION CABINET PANEL 3 REAR >>>	F-21
1A-19	Q1H11NGB2504L-A	"L" BALANCE OF PLANT PANEL >>>	F-22
	Q1H11NGB2504M-A	"M" BALANCE OF PLANT PANEL >>>	F-24
1A-20	Q1H25L0006-A	6A TERMINATION CABINET PANEL 4 REAR >>>	F-25
1A-21	Q1H11NGSSP2506N-A	"A" TRAIN SSPS TEST CABINET (TURB - TRN A TRIPS & GEN TIME DELAY TRIP AFTER TURB TRIP CKTS)	
1A-22	Q1H22L0001B-A	1B MULTIPLYING RELAY CABINET >>>	F-26
	Q1P15L0001A-A	1A SAMPLE CONTROL PNL AUX RELAY CAB >>>	F-27
1A-23	Q1H11NGASC2506D-A	"D" AUXILIARY SAFEGUARD CABINET >>>	F-28
1A-24	Q1H22L0001E-A	1E MULTIPLYING RELAY CABINET >>>	F-29
1A-25	NSH11NGLCR2507I-N	LOAD CONTROL REMOTE UNIT CONTROL POWER FUSEBLOCK (10A)	
1A-26	----------	SPARE	
1A-27	Q1H25L0004-A	4A TERMINATION CABINET PANEL 3 REAR >>>	F-30
1A-28	----------	SPARE	
1A-29	Q1H25L0004-A	4A TERMINATION CABINET PANEL 3 REAR >>>	F-31
1A-30	----------	SPARE	

DF03
ED04
LA13
1B 125V DC DIST PNL AB-139' D177082

BKR	TPNS	DESCRIPTION	SEE PAGE
	Q1R41L0001B-A	**1B 125V DC DISTRIBUTION PANEL <<< LA13**	
1B-01	Q1R15A0006-A	1F 4160V BUS DC CONTROL POWER FOR INCOMING BREAKERS DF01, DF08 & DF15	
1B-02	Q1R16B0002-A	1A 600V LOAD CENTER DC CONTROL POWER FOR INCOMING BREAKERS EA02, EA07, EA08 & EA09	
1B-03	Q1R15A0006-A	1F 4160V BUS DC CONTROL PWR FOR FEEDER BREAKERS DF02, DF03, DF04, DF05, DF06, DF07, DF09, DF10, DF11, DF12, DF13	
		1F 4160V BUS U/F TRIP AUX RELAYS (TRIP DG BKR DF08)	
1B-04	Q1R16B0002-A	1A 600V LOAD CNTR DC CONT PWR FOR FDR BKRS EA03, EA04, EA05, EA06, EA10, EA11, EA12, EA13, EA14, EA15 & EB05 (PWR FROM EA12)	
1B-05	**Q1H21NBL2702A-A**	**"A" TRAIN PENETRATION ROOM ISOLATION PANEL >>>**	**F-59**
1B-06	Q1R16B0006-A	1D 600V LOAD CENTER DC CONTROL POWER FOR INCOMING BREAKERS ED02, ED08 & ED12	
1B-07	Q1R15A0503-A	1H 4160V BUS DC CONTROL POWER FOR BREAKERS DH01, DH02, DH03, DH04, DH05, DH07 & DH08	
		1H 4160V BUS U/F TRIP AUX RELAYS (TRIP DG BKR DH07)	
	N1R15A0508-N	1H 4160V BUS BKR TEST CABINET	
1B-08	Q1R16B0006-A	1D 600V LOAD CENTER DC CONT POWER FOR FEEDER BREAKERS ED03, ED04, ED05, ED06, ED09, ED10, ED11, ED13, ED14, ED15 & ED16	
1B-09	N1C11L0005A-N	1A CRDM M-G SET CONTROL CABINET POWER TO STARTER BKR 52-2, FIELD FLASH & OUTPUT CT	
1B-10	Q1R16B0508-A	1R 600V LOAD CENTER DC CONTROL POWER FOR INCOMING BREAKER ER02	

DF03
ED04
LA13
1B 125V DC DIST PNL AB-139' D177082
(CONT'D)

BKR	TPNS	DESCRIPTION	SEE PAGE
1B-11	N1R15G0001C-N	1F 4160V BUS BREAKER TEST CABINET	
1B-12	**Q1N21L0001A-A**	**1A HOT SHUTDOWN PANEL AUX RELAY CABINET >>>**	**F-60**
1B-13	Q1H21E0004-A	1F 4160V BUS LOCAL CONTROL PANEL DIFFERENTIAL LOCKOUT RELAY CONTROL CIRCUIT	
1B-14	Q1R43E0001A-A	1F BUS LOADING SEQUENCER CONTROL POWER TO: LOSP SEQ, LOAD SHEDDING, BKR CLOSE FAILURE & SEQ LOCAL ANNUN	
1B-15	Q1H21E0504-A	1H 4160V BUS LOCAL CONTROL PANEL DIFFERENTIAL PROTECTION CONTROL CIRCUIT	
1B-16	Q1C11E0004B-AB	"A" REACTOR TRIP SWITCHGEAR CONTROL POWER TO BYPASS BREAKER & REACTOR TRIP BREAKER	
1B-17	**Q1H21NBAFP2605A-A**	**1A LOCAL HOT SHUTDOWN PANEL >>>**	**F-61**
	Q1H21NBAFP2605G-A	**1G LOCAL HOT SHUTDOWN PANEL >>>**	**F-62**
1B-18	Q1R43E0501A-A	1H BUS LOADING SEQUENCER CONTROL POWER TO LOAD SHEDDING CONTROL CIRCUIT	
1B-19	**Q1H25L0004-A**	**4A TERMINATION CABINET PANEL 4 REAR >>>**	**F-63**
1B-20	N1R15A0003-N	1C 4160V BUS UNDERVOLTAGE AND UNDERFREQUENCY PROTECTIVE RELAYING & RCP AUX PT CAB. N1R15A003X, DCX3 TIMING & ALARM RELAYS 2-3, 2-4, AND 74-1	
		1C 4160V BUS DC CONTROL POWER FOR RCP BUS U/V TRIP LOGIC AUX RELAYS 2-1 & 2-2	
		1C 4160V BUS DC CONTROL POWER FOR RCP BUS U/F TRIP LOGIC RELAYS 81-1 & 81-2	
		1C 4160V BUS DC CONTROL POWER FOR BUS U/V AUX RELAYS 27-2X & 27-4X (SYNCHRONIZING CHECK PERMISSIVE, LOAD SHED, ALARM)	
1B-21	**Q1H25L0006-A**	**6A TERMINATION CABINET PANEL 1 FRONT >>>**	**F-64**
1B-22	----------	SPARE	

DG03
EE05
LB07
1E 125V DC DIST PNL AB-121' D177083

BKR	TPNS	DESCRIPTION	SEE PAGE
	Q1R41L0001E-B	**1E 125V DC DISTRIBUTION PANEL <<< LB07**	
1E-01	Q1R15A0007-B	1G 4160V BUS DC CONTROL POWER FOR INC BREAKERS DG01, DG08 & DG15	
1E-02	Q1R16B0005-B	1C 600V LOAD CENTER DC CONTROL POWER FOR INC BREAKERS EC02, EC07, EC08 & EC10	
1E-03	Q1R15A0007-B	1G 4160V BUS DC CONTROL POWER FOR FEEDER BREAKERS DG02, DG03, DG04, DG05, DG06, DG07, DG09, DG10, DG11, DG12 & DG13	
		1G 4160V BUS U/F TRIP AUX RELAYS (TRIP DG BKR DG08)	
1E-04	Q1R16B0005-B	1C 600V LOAD CENTER DC CONTROL POWER FOR FDR BREAKERS EC03, EC04, EC05, EC06, EC09, EC11, EC12, EC13 & EC14	
1E-05	**Q1H21NBL2702B-B**	**"B" TRAIN PENETRATION ROOM ISOLATION PANEL >>>**	G-55
1E-06	Q1R16B0007-B	1E 600V LOAD CENTER DC CONTROL POWER FOR INC BREAKERS EE02, EE07 & EE12	
1E-07	Q1R15A0504-B	1J 4160V BUS DC CONTROL POWER FOR BREAKERS DJ01, DJ02, DJ03, DJ04, DJ06 & DJ07	
		1J 4160V BUS U/F TRIP AUX RELAYS (TRIP DG BKR DJ06)	
	N1R15A0509-N	1J 4160V BUS BREAKER TEST CABINET	
1E-08	Q1R16B0007-B	1E 600V LOAD CENTER DC CONTROL POWER FOR FEEDER BREAKERS EE03, EE05, EE06, EE08, EE09, EE10, EE11, EE13, EE14, EE15	

DG03
EE05
LB07
1E 125V DC DIST PNL AB-121' D177083
(CONT'D)

BKR	TPNS	DESCRIPTION
1E-09	N1C11L0005B-N	1B CRDM M-G SET CONTROL CABINET POWER TO STARTER BKR 52-2, FIELD FLASH & OUTPUT CT
1E-10	Q1R16B0509-B	1S 600V LOAD CENTER CONTROL POWER FOR INC BREAKER ES02
1E-11	N1R15G0001D-N	1G 4160V BUS BREAKER TEST CABINET
1E-12	----------	SPARE
1E-13	Q1H21E0005-B	1G 4160V BUS LOCAL CONTROL PANEL DIFFERENTIAL LOCKOUT RELAY CONTROL CIRCUIT
1E-14	Q1R43E0001B-B	1G BUS LOADING SEQUENCER CONTROL POWER TO: LOSP SEQ, LOAD SHEDDING, BKR CLOSE FAILURE & SEQ LOCAL ANNUN
1E-15	Q1H21E0505-B	1J 4160V BUS LOCAL CONTROL PANEL DIFFERENTIAL PROTECTION CONTROL CIRCUIT
1E-16	Q1C11E0004A-AB	"B" REACTOR TRIP SWITCHGEAR CONTROL POWER TO BYPASS BREAKER & REACTOR TRIP BREAKER
1E-17	----------	SPARE
1E-18	Q1R43E0501B-B	1J BUS LOADING SEQUENCER CONTROL POWER TO LOAD SHEDDING CIRCUIT
1E-19	----------	SPARE
1E-20	----------	SPARE
1E-22	----------	SPARE

DH01
EG05
FHA4
1K-36
1G 125V DC DIST PNL **AB - 139'** **D177082**
D181743

BKR	TPNS	DESCRIPTION
	N1R41L0001G-N	**1G 125V DC DISTRIBUTION PANEL <<< 1K-36**
1G-01	N1R15A0001-N	1A 4160V BUS DC CONTROL POWER FOR INCOMING BKRS DA01 & DAO7
1G-02	N1R16B0003-N	1B 600V LOAD CENTER DC CONTROL PWR FOR INCOMING BKR EB02 & EB07
		1B 600V LOAD CENTER LOSS OF DC PWR & U/V RELAY 27 SIGNAL TO AUX RLY 27X-1
1G-03	N1R15A0001-N	1A 4160V BUS DC CONTROL POWER FOR RCP BUS U/V TRIP LOGIC AUX RLYS 2-1 & 2-2, AND RCP AUX PT CAB. N1R15A001X, DAX4 TIMING & ALARM RLYS 2-3, 2-4, 75-1
		1A 4160V BUS DC CONTROL POWER FOR RCP BUS U/F TRIP LOGIC RLYS 81-1 & 81-2
		1A 4160V BUS DC CONTROL POWER FOR BUS U/V AUX RELAYS 27-2X & 27-4X (SYNC CHECK PERMISSIVE LOAD SHED, ALARM)
		1A 4160V BUS DC CONTROL POWER FOR FDR BKRS DA03, DA04, DA05, DA06 & LOSS OF DC (VOLTAGE ALARM RELAY 74)
1G-04	N1R16B0003-N	1B 600V LOAD CENTER CONTROL PWR FOR FEEDER BKRS EB03,EB04,EB08,EB09,EB10 & EB11
1G-05	N1R15A0003-N	1C 4160V BUS DC CONTROL POWER FOR INCOMING BRKRS DC01 & DC04
1G-06	N1R16B0014-N	1M 600V LOAD CENTER DC CONTROL PWR FOR INCOMING BKRS EM02 & EM07

DH01
EG05
FHA4
1K-36
1G 125V DC DIST PNL **AB - 139'** **D177082**
(CONT'D) **D181743**

FUSE	TPNS	DESCRIPTION	SEE PAGE
1G-07	N1R15A0003-N	1C 4160V BUS DC CONTROL POWER FOR FDR BRKRS DC03 AND DC05 AND LOSS OF DC (VOLTAGE ALARM RLY 74)	
1G-08	N1R16B0014-N	1M 600V LOAD CENTER CONTROL PWR FOR FEEDER BKRS EM03,EM04,EM05,EM06	
1G-09	N1R15G0001A-N	BKR TEST CABINET FOR 4KV BUS 1A	
1G-10	N1Y43S0010A-N & B-N	125VDC FIRE PROTECTION SAFETY SWITCHES >>> DIESEL GENERATOR BLDG C02 SYSTEM CONTROL POWER (SYSTEMS 1D-78, ID-79, 1D-80, 1D-81)	
1G-11	N1V43G0086-N	LORAIN INVERTER >>> FP SMOKE DETECTION SYSTEM CABINETS N1V43G0082, 83, 84, 85, 130, 131, 132, 133, & 134-N (POWER TO FIRE IND UNIT, ZONE IND UNITS, & SUPPLEMENTARY RELAY PANELS)	
1G-12	**Q1H11NGB2504P-N**	**PLANT BALANCE OF PLANT PNL "P"**	**H-16**
	Q1H11NGB2504Q-N	**PLANT BALANCE OF PLANT PNL "Q"**	**H-18**
1G-13	----------	SPARE	
1G-14	----------	SPARE	
1G-15	**N1G24GWEP2614-N**	**WASTE ENCAPSULATION PANEL >>>**	**H-19**

DH01
EG05
FHA4
1K-36
1G 125V DC DIST PNL **AB - 139'** **D177082**
(CONT'D) **D181743**

FUSE	TPNS	DESCRIPTION
1G-16	N1E12YSH3186A-N	CTMT COOLER 1A VIBRATION SWITCH RESET COIL
	N1E12YSH3186B-N	CTMT COOLER 1B VIBRATION SWITCH RESET COIL
	N1E12YSH3186C-N	CTMT COOLER 1C VIBRATION SWITCH RESET COIL
	N1E12YSH3186D-N	CTMT COOLER 1D VIBRATION SWITCH RESET COIL
1G-17	N1V47L0003-N	LOWER EQUIP RM INTAKE & EXHAUST DAMPERS LOCAL CONTROL STATION - SV'S & POS IND LTS FOR DAMPERS N1V47HV2774,HV2778,HV2777,HV2780
1G-18	N1T50TAH2790A-N	CTMT PRE-ACCESS FILTER UNIT 1A FIRE DET PNL
	N1T50TAH2790B-N	CTMT PRE-ACCESS FILTER UNIT 1B FIRE DET PNL
1G-19	N1V43G0096-N	SPRINKLER SYSTEM 1A-52A (DOSIMETRY LAB RM 461) TROUBLE HORN
	N1V43G0097-N	SPRINKLER SYSTEM 1A-52A ALARM BELL
	N1V43G0771A-N	SPRINKLER SYSTEM 1A-52B (HP OFFICE/LAB, CLEAN REST ROOMS) TROUBLE HORN
	N1V43G0772A-N	SPRINKLER SYSTEM 1A-52B FIRE BELL
1G-20	N1V43G0102-N	SPRINKLER SYSTEM 1A-21 (STORAGE RM 167 - ELEV. 100') FIRE BELL
	N1V43G0101-N	SPRINKLER SYSTEM 1A-21 TROUBLE HORN
	----------	SPRINKLER SYSTEM 1A-21 AUX ANNUN RELAY
	N1V43G0135-N	SPRINKLER SYS SUPPRESSION ZONE 1A-132 (COMBUST STOR RM 107 & AUX BLDG WEST ELEV. 83') FIRE BELL
	N1V43G0136-N	SPRINKLER SYS SUPPRESSION ZONE 1A-132 TROUBLE HORN
	N1V43G0137-N	SPRINKLER SYS SUPPRESSION ZONE 1A-132 ACTUATION IND LIGHT

DH01
EG05
FHA4
1K-36
1G 125V DC DIST PNL **AB - 139'** **D177082**
(CONT'D) **D181743**

FUSE	TPNS	DESCRIPTION
1G-21	----------	SPARE
1G-22	----------	SPARE
1G-23	N1V43G0012N-N	SPRINKLER SYS SUPPRESSION ZONE 1A-48 (AUX BLDG NORTH CORRIDOR ELEV. 139') ACTUATION IND LIGHT
	N1V43G0002Y-N	SPRINKLER SYS SUPPRESSION ZONE 1A-48 TROUBLE HORN
	N1V43G0003Y-N	SPRINKLER SYS SUPPRESSION ZONE 1A-48 FIRE BELL
	N1V43G0012P-N	SPRINKLER SYS SUPPRESSION ZONE 1A-53 (TRAIN A,N,V VERT CABLE CHASE ELEV. 83-144') ACTUATION IND LIGHT
	N1V43G0012Q-N	SPRINKLER SYS SUPPRESSION ZONE 1A-55 (TRAIN B,S,W VERT CABLE CHASE ELEV. 83-155') ACTUATION IND LIGHT
	N1V43G0012T-N	SPRINKLER SYS SUPPRESSION ZONE 1A-45 (PIPE PENE RM 223 ELEV. 139') ACTUATION IND LIGHT
	N1V43G0004A-N	SPRINKLER SYS SUPPRESSION ZONES 1A-53, 1A-55, 1A-45 TROUBLE HORN
	N1V43G0005A-N	SPRINKLER SYS SUPPRESSION ZONES 1A-53, 1A-55, 1A-45 FIRE BELL
1G-24	----------	SPARE

DH01
EG05
FHA4
1K-36
1G 125V DC DIST PNL **AB - 139'** **D177082**
(CONT'D) **D181743**

FUSE	TPNS	DESCRIPTION
1G-25	N1V43G0012L-N	SPRINKLER SYS SUPPRESSION ZONE 1A-61 (TRAIN "B" CABLE CHASE FROM DG BLDG) ACTUATION IND LIGHT
	N1V43G0012F-N	SPRINKLER SYS SUPPRESSION ZONE 1A-62 (AFW PUMPS CABLE AREA ELEV. 100') ACTUATION IND LIGHT
	N1V43G0012K-N	SPRINKLER SYS SUPPRESSION ZONE 1A-119 (NORTHWEST CORNER RM 185 & CCW PUMP AREA ELEV. 100') ACTUATION IND LIGHT
	N1V43G0012U-N	SPRINKLER SYS SUPPRESSION ZONE 1A-27 (CCW PUMP 1B 5KV SW 1A & 1B AND CABLE TRAY AREA, RM 185 ELEV. 100') ACTUATION IND LIGHT
	N1V43G0012E-N	SPRINKLER SYS SUPPRESSION ZONE 1A-60 (TRAIN "A" CABLE CHASE FROM DG BLDG) ACTUATION IND LIGHT
	N1V43G0003R-N	SPRINKLER SYS SUPPRESSION ZONES 1A-61,1A-62,1A-119,1A-27,1A-60 FIRE BELL
	N1V43G0002R-N	SPRINKLER SYS SUPPRESSION ZONES 1A-61,1A-62,1A-119,1A-27,1A-60 TROUBLE HORN

DHO1
EG07
FJB4
1J-27
1H 125V DC DIST PNL AB - 139' D177083

BKR	TPNS	DESCRIPTION
	N1R41L0001H-N	**1H 125V DC DISTRIBUTION PANEL <<< 1J-27**
1H-01	N1R15A0002-N	1B 4160V BUS DC CONTROL POWER FOR INCOMING BKRS DB01&DB05
1H-02	N1R16B0009-N	1I 600V LOAD CENTER DC CONTROL PWR FOR INCOMING BKRS EI02 & EI05
1H-03	N1R15A0002-N	1B 4160V BUS DC CONTROL POWER FOR RCP BUS U/V TRIP LOGIC AUX TIMING RELAYS 2-1 & 2-2, AND RCP AUX PT CABINET N1R15A002X, DBX3 TIMING & ALARM RLYS 2-3, 2-4, 74-1
		1B 4160V BUS DC CONTROL PWR FOR RCP BUS U/F TRIP LOGIC RELAYS 81-1 & 81-2
		1B 4160V BUS DC CONTROL POWER FOR BUS U/V AUX RELAYS 27-2X & 27-4X (SYNC CHECK PERMISSIVE, LOAD SHED ALARM)
		1B 4160V BUS DC CONTROL POWER FOR FDR BKRS DB03 & DB04 AND LOSS OF DC VOLTAGE ALARM RELAY 74
1H-04	N1R16B0009-N	1I 600V LOAD CENTER DC CONTROL PWR FOR FEEDER BKRS EI03 & EI04
1H-05	N1R15G0001B-N	BKR TEST CABINET FOR 4KV BUS 1B & 1C
1H-06	N1R16B0015-N	1N 600V LOAD CENTER DC CONTROL PWR FOR INCOMING BKRS EN02 & EN04
1H-07	N1V47HS3633-N	600V AUX BLDG LOAD CENTER RM DAMPER SV'S LOCAL CONTROL STATION - DAMPER SVS N1V47SV3633A - H & POS IND LIGHTS
1H-08	N1R16B0015-N	1N 600V LOAD CENTER DC CONTROL PWR FOR FEEDER BKRS EN03,EN05,EN06,EN07 AND EN08
		1N 600V LOAD CENTER DC CONTROL PWR FOR STATION SERVICE XFMR 1N DIFFERENTIAL PROTECTION

DHO1
EG07
FJB4
1J-27
1H 125V DC DIST PNL AB - 139' D177083
(CONT'D)

BKR	TPNS	DESCRIPTION
1H-09	----------	SPARE
1H-10	NSV46SV3860-N	RADIOACTIVE LAB EXH DAMPER "A" SV
	NSV46SV3861-N	RADIOACTIVE LAB EXH DAMPER "A" SV
	NSV46SV3862-N	RADIOACTIVE LAB EXH DAMPER "B" SV
	NSV46SV3863-N	RADIOACTIVE LAB EXH DAMPER "B" SV
	NSV46SV3864-N	GAS ANALYSIS RM EXH DAMPER SV
	NSV46SV3865-N	GAS ANALYSIS RM EXH DAMPER SV
1H-11	----------	SPARE
1H-12	----------	SPARE
1H-13	N1G21NDWE2609-N	WASTE EVAPORATOR CONTROL PNL ANNUN & VALVE POS IND LIGHTS
1H-14	----------	SPARE
1H-15	N1G21G0019-N	CTMT SUMP PUMP ALTERNATOR
	----------	MAIN TURBINE AC BEARING OIL PUMP (NIN33M0501-N) DISCH PRESS SWITCH AUX RELAY 63X: AUTO CLOSE PERMISSIVES FOR ALT BRG OIL PUMP BKR EG04 & AUX SEAL OIL BACKUP PUMP (N1N33M0503-N)
1H-16	N1G21NDRE2608-N	RE-CYCLE EVAPORATOR CONTROL PANEL ANNUN & VALVE POS IND LIGHTS
1H-17	N1V46TAH2792-N	RADWASTE FILTRATION UNIT FIRE DETECTION PANEL CONTROL POWER
	N1P13TAN2791-N	CTMT PURGE FILTER UNIT FIRE DETECTION PANEL CONTROL POWER
	N1V48TAH2800-N	SPENT FUEL POOL FILTRATION UNIT FIRE DETECTION PANEL CONTROL POWER

DHO1
EG07
FJB4
1J-27
1H 125V DC DIST PNL **AB - 139'** **D177083**
(CONT'D)

BKR	TPNS	DESCRIPTION
1H-18	----------	SPARE
1H-19	N1P16V0588-N	CIRCULATING WATER BLOWDOWN VALVE SOLENOID 20-12
1H-20	N1G24NDSGB2611-N	STEAM GEN BLOWDOWN PROCESSING PANEL CONTROL CKT (VALVES 1TCV-1150 & 1152,1RCV-023B,1-7604 & 7607 AND FAILURE RELAY XY\1180B FOR ANNUN)
1H-21	N1V43G0091-N	CASK WASH AREA (EL. 155') SPRINKLER SYSTEM (ZONE 1A-58) TROUBLE HORN
	N1V43G0092-N	CASK WASH AREA (EL. 155') SPRINKLER SYSTEM (ZONE 1A-58) ALARM BELL
1H-22	----------	SPARE
1H-23	N1V43G0012B-N	AUX BLDG WEST CORRIDOR (ELEV. 139') SPRINKLER SYSTEM (ZONE 1A-59) ACTUATION IND LIGHT
	N1V43G0012C-N	AUX BLDG WEST VERTICLE CABLE CHASE SPRINKLER SYSTEM (ZONE 1A-23) ACTUATION IND LIGHT
	N1V43G0012G-N	CABLE SPREADING RM (ELEV. 139') SPRINKLER SYSTEM (ZONE 1A-43) ACTUATION IND LIGHT
	N1V43G0002S-N	SPRINKLER SYSTEM SUPPRESSION ZONES 1A-59, 1A-23, & 1A-43 TROUBLE HORN

DHO1
EG07
FJB4
1J-27
1H 125V DC DIST PNL **AB - 139'** **D177083**
(CONT'D)

BKR	TPNS	DESCRIPTION
1H-23	N1V43G0003S-N	SPRINKLER SYSTEM SUPPRESSION ZONES 1A-59, 1A-23, & 1A-43 ALARM BELL
1H-24	----------	SPARE
1H-25	N1V43G0012H-N	AUX BLDG FILT HATCH ACCESS RM (ELEV. 155') SPRINKLER SYSTEM (ZONE 1A-112) ACTUATION IND LIGHT
	N1V43G0012J-N	AUX BLDG WEST CORRIDOR (ELEV. 155') SPRINKLER SYSTEM (ZONE 1A-114) ACTUATION IND LIGHT
	N1V43G0003T-N	SPRINKLER SYSTEM SUPPRESSION ZONES 1A-112 & 1A-114 ALARM BELL
	N1V43G0002T-N	SPRINKLER SYSTEM SUPPRESSION ZONES 1A-112 & 1A-114 TROUBLE HORN
	N1V43G0012A-N	DOSIMETRY LAB & NON-RAD VENT EQUIP ROOMS 461, 462, 463, 464 (ELEV. 155') SPRINKLER SYSTEM (ZONE 1A-51) ACTIVATION IND LIGHT
	N1V43G0002N-N	SPRINKLER SYSTEM SUPPRESSION ZONE 1A-51 HORN
	N1V43G0003N-N	SPRINKLER SYSTEM SUPPRESSION ZONE 1A-51 BELL
1H-26	----------	SPARE

jpm j.

SO-444

TITLE: Restore Compressed Air Systems After An Auto Isolation

PROGRAM APPLICABLE: SOIT ___ SOCT ___ HLT _X_ LOCT ___

ACCEPTABLE EVALUATION METHOD: ___ PERFORM _X_ SIMULATE ___ DISCUSS

EVALUATION LOCATION: ____ SIMULATOR ____ CONTROL ROOM _X_ PLANT

PROJECTED TIME: _8 MIN_ SIMULATOR IC NUMBER: _N/A_

ALTERNATE PATH ____ TIME CRITICAL ____ PRA _____

JPM DIRECTIONS:

1. All actions will be **SIMULATED.**
2. This JPM to be performed on UNIT 1 ONLY.
3. Provide student HANDOUT and procedure.
4. Allow student time to review conditions and procedure.

TASK STANDARD:

1. Restore Compressed Air Systems After An Auto Isolation on Unit 1.

Examinee:				
Overall JPM Performance:	**Satisfactory**	☐	**Unsatisfactory**	☐
Evaluator Comments (attach additional sheets if necessary)				

EXAMINER:_____

Developer	S. Jackson	Date: 4/6/15
NRC Approval	SEE NUREG 1021 FORM ES-301-3	

CONDITIONS

When I tell you to begin, you are to RESTORE COMPRESSED AIR SYSTEMS AFTER AN AUTO ISOLATION. The conditions under which this task is to be performed are:

a. An auto isolation of the compressed air system has occurred.
b. Cause of auto isolation has been found and corrected.
c. Sufficient air compressors have been returned to continuous service.
d. Directed by control room operator to perform FNP-1- SOP-31.0, Section 4.1 step 2 and continue with the procedure.
e. A pre-job brief is not required.

NOTE: THIS JPM WILL BE PERFORMED ON UNIT 1 ONLY.

EVALUATION CHECKLIST

	ELEMENTS:	STANDARDS:	RESULTS: (CIRCLE)
	____ START TIME		
	NOTE: All steps come from Section 4.1 of SOP-31.0		
*1.	2 **Reset**, **close** Air Dryer AUTO BYP VLV N1P19V902.	Reset button for N1P19V902 depressed. **(CUE: Valve position indicating light not illuminated, if valve position checked, valve is as you see it.)**	S / U
2.	3 **Reset**, **open** Non-Essential IA AUTO ISO VLV N1P19V904.	Reset button for N1P19V904 depressed. **(CUE: Valve position indicating light not illuminated, if valve position checked, valve is as you see it.)**	S / U
*3.	4 **Crack open** Essential IA HDR ISO BYP VLV N1P19V942C, allow DP to equalize.	N1P19V942C turned counter-clockwise to crack open. **(CUE: Handle is as you describe and flow noise is heard the stops.)**	S / U
*4.	5 **Reset**, **open** Essential IA HDR AUTO ISO VLV N1P19V903.	Reset button N1P19V903 depressed. **(CUE: Valve position indicating light not illuminated, if valve position checked valve is as you see it.)**	S / U

EVALUATION CHECKLIST

ELEMENTS:	STANDARDS:	RESULTS: (CIRCLE)
*5. 6 **Close** Essential IA HDR BYP VLV N1P19V942C.	N1P19V942C turned clockwise to close. **(CUE: Valve handle is as you see it.)**	S / U

_____ STOP TIME

Terminate after V942 is closed.

CRITICAL ELEMENTS: Critical Elements are denoted with an Asterisk (*) preceding the element number.

GENERAL REFERENCES:

1. FNP-1-SOP-31.0, Version 80.0
2. K/A 065AA1.03 - 2.9 / 3.1

GENERAL TOOLS AND EQUIPMENT:

None

Critical ELEMENT justification:	
1	Critical- If the air dryers are left bypassed for a significant period of time, moisture in the air line would negatively affect component operation.
2	Not Critcal – No critical equipment in the Service building.
3	Critical – Without equalizing pressure, opening V903 may cause air pressure to drop to the point of another auto isolation
4	Critical – Task completion. Allows for regaining control of AOVs.
5	Critical – Task completion. Would prevent the system from automatically isolating future leaks.

COMMENTS:

jpm j

CONDITIONS

When I tell you to begin, you are to RESTORE COMPRESSED AIR SYSTEMS AFTER AN AUTO ISOLATION. The conditions under which this task is to be performed are:

a. An auto isolation of the compressed air system has occurred.
b. Cause of auto isolation has been found and corrected.
c. Sufficient air compressors have been returned to continuous service.
d. Directed by control room operator to perform FNP-1- SOP-31.0, Section 4.1 step 2 and continue with the procedure.
e. A pre-job brief is not required.

SOUTHERN COMPANY

FARLEY
Unit 1

SAFETY RELATED

FNP-1-SOP-31.0

COMPRESSED AIR SYSTEM

VERSION 80.0

PROCEDURE LEVEL OF USE CLASSIFICATION PER NMP-AP-003	
CATEGORY	**SECTIONS**
Continuous	ALL
Reference	NONE
Information	NONE

Approval: David L Reed (Approved By) 05/21/2015 (Date)

Effective Date:

OPERATIONS
Responsible Department

VERSION SUMMARY
Version 78.0 Description
Reformatted to new Fleet Template per NMP AP 002 GL02, SNC Fleet Procedure Template Guidelines. Updated procedure to requirements of NMP-AP-002, SNC Fleet Procedures Writers Guide. Updated SEQ OPS & incorporated SAC Appendixes into main body of procedure.
Version 79.0 Description
Added Sections 4.2.2, 4.2.3, 4.3.2, 4.3.3, 4.4.2, 4.4.3 for starting/stopping A/C from MCB
Version 80.0 Description
Split Sections into individual Sections for each SAC.

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1.0 PURPOSE

This procedure provides Initial Conditions, Precautions, Limitations, Instructions for operation of Compressed Air SYS. ☐

2.0 INITIAL CONDITIONS

1. Electrical DIST SYS energized for normal operation per FNP-1-SOP-36.0, Plant Electrical DIST Line-Up, FNP-1-SOP-36.4, 120V A.C. DIST SYS, with exceptions noted.
2. Compressed Air SYS valves, Electrical DIST SYS, aligned per SYS Check Lists FNP-1-SOP-31.0A, B, C, D with exceptions noted.
3. SW available to supply cooling water to SACs.
4. Figures show helpful information.

3.0 PRECAUTIONS AND LIMITATIONS

1. **Open** air valves slowly to allow PRESS to equalize gradually. ☐
2. **Do Not** operate SACs without cooling water. ☐
3. Configure SACs at their LCPs to Remote [MCB] or Local to unload prior to stopping. ☐
4. 1B AND 1C SACs must be isolated from SEQ per Section 4.8.2 AND Section 4.8.3, placed in Remote CONT (MCB) IF removing power from 1A SAC. [BKR open] ☐
5. In order to prevent excessive condensation, DO NOT circulate cooling water through SAC removed from service. [via SW Supply BYP VLV] ☐
6. **Maintain** cooling water outlet temperature < 122°F. [“Cooling Water Element Out” on SAC LCP display screen] ☐
7. SACs have MAX permissible number of motor starts of 5 per hour. Recommended by manufacturer to observe interval of 20 minutes between each manual start. ☐
8. Stop times. [NOT associated with power loss]
   a. **When** in Local or Remote CONT, Programmed Stop Time (SAC): After pressing stop button, SAC runs unloaded for 3 seconds, then stops. Start command during this period ignored. ☐
   b. **When** in Local or Remote CONT, MIN Stop Time (SAC Motor): After stopping, module prevents motor from restarting for 20 seconds. Start command during this time will be memorized, executed after 20 second time period. ☐

3.0 PRECAUTIONS AND LIMITATIONS (continued)

9. **When** SAC configured for Remote CONT, SAC will (1) stop if MCB hand switch selected to OFF or (2) start, load if MCB hand switch taken to AUTO position, based on Internal Mode PRESS settings on SAC, Automatic Operation LED on SAC LCP will be lit. When SAC configured for LAN or Local, MCB hand switch disabled. ☐

10. **Do Not** use EMERGENCY STOP button for normal shutdown of SAC (normal stop unloads SAC first, maintains cooling water flow to SAC for several seconds after stopping. EMERGENCY STOP does neither). ☐

11. Automatic Restart After Voltage Failure Function activated for SACs. For any SAC, if aligned for operation prior to loss of power, it will resume operation after its power supply restored dependent upon its internal PRESS switch demand. Following A-TRN LOSP, power supply to 1C SAC automatically re-energized following B1F Sequencer operation. 1A SAC must be manually aligned to re-start following LOSP. ☐

12. **When** on SEQ (MCC function) SAC's internal PRESS settings disabled. SAC will load, unload by SEQ based on 1A SAC outlet PRESS (PRI REG). IF SEQ fails or loses power, SACs controlled by their internal PRESS switches. When in Local or Remote CONT, SAC start-load/unload-stop operation controlled by its internal PRESS settings, timers, as long as Automatic Operation LED (green) LIT. IF operation by Internal Mode PRESS settings desired, **refer** to Section 4.2, Section 4.3 or Section 4.4 for guidance on operating SAC in Local or Remote. ☐

13. Pressing F2 from Main Screen on 1A SAC PRI REG will activate MCC (SEQ) Screen showing 1A, 1B, 1C SAC status. If one of SACs not reacting on command from PRI REG, press F2 ("Reset" Key) to reset communication between PRI REG SEQ, other two Secondary Regulators. [Figure 4] ☐

14. SAC Protection:

    a. Number of times based AUTO start/stop commands programmed on SACs. ☐

    b. **Take** into account start command will be executed (if programmed, activated), even after manually stopping SAC. ☐

    c. Several sensors provided on SAC. If one of these measurements exceeds programmed S/D level, SAC will stop. This will be indicated on display, General Alarm LED will blink. **Refer** to Figure 6 for guidance on various shut-down messages, S/D warning messages. ☐

    d. IF measurements exceeds programmed S/D warning levels, message will appear on SAC LCP Display Screen, General Alarm LED will light up to warn operator S/D warning level exceeded. message disappears when warning condition clears. ☐

3.0 PRECAUTIONS AND LIMITATIONS (continued)

15. Service warning: A number of service operations are grouped (called Level A, B, C, ...). Each level has programmed time interval. If time interval exceeded, a message will appear on display (1) to warn operator to carry out service actions belonging to that level. ☐

16. Warning functions prior to S/D:

    a. LO PRESS Outlet Air TEMP (ELE 1), 410°F. ☐

    b. HI PRESS Inlet Air TEMP (ELE 2), 149°F. ☐

    c. HI PRESS Outlet Air TEMP (ELE 2), 410°F. ☐

    d. Oil TEMP, 149°F. ☐

    e. Oil PRESS LO, 18.9 PSIG. ☐

17. S/D functions:

    a. LO PRESS Outlet Air TEMP HI (ELE 1), 428°F. ☐

    b. HI PRESS Inlet Air TEMP HI (ELE 2), 158°F. ☐

    c. HI PRESS Outlet Air TEMP HI (ELE 2), 428°F. ☐

    d. Oil TEMP HI, 158°F. ☐

    e. Oil PRESS LO, < 17.4 PSIG. ☐

    f. SW DISCH TEMP HI, 122°F. ☐

    g. Drive Motor Overload. ☐

    h. Vent Fan Motor Overload. ☐

    i. Emergency Stop Button on SAC Local Panel. ☐

    j. Loss of Control Power to SAC Local Panel. ☐

    k. Loss of 600 V Power to SAC. ☐

4.0 INSTRUCTIONS

4.1 COMPRESSED AIR SYS STARTUP, NORMAL OPERATION

NOTES

- SECT 4.1 Step 2 through SECT 4.1 Step 11 only required if Compressed Air SYS been completely S/D, SYS being placed in-SERV with initial SAC. ☐
- These steps should have been completed if Compressed Air SYS in-SERV; however, IF desired, steps can be verified when SAC placed in-SERV. ☐

1. **Place** 1A, 1B AND/OR 1C SAC in service per Section 4.2 1A ,Section 4.3 1B or Section 4.4 1C. ☐
2. **Reset**, **close** Air Dryer AUTO BYP VLV N1P19V902. ☐
3. **Reset**, **open** Non-Essential IA AUTO ISO VLV N1P19V904. ☐

CAUTION

In the following step, open air VLV slowly to allow PRESS to equalize gradually. ☐

4. **Crack open** Essential IA HDR ISO BYP VLV N1P19V942C, allow DP to equalize. ☐
5. **Reset**, **open** Essential IA HDR AUTO ISO VLV N1P19V903. ☐
6. **Close** Essential IA HDR BYP VLV N1P19V942C. ☐
7. **Open** the following valves to supply IA to PPR, CTMT:
   - IA to PENE RM N1P19HV3885. ☐
   - IA to PENE RM N1P19HV3825. ☐
   - IA to CTMT Q1P19HV3611. ☐
8. **Verify** IA PRESS ≈ 90 - 100 PSIG. ☐

NOTES

- Purge PRESS can only be read, adjusted when off-stream desiccant chamber depressurized for regeneration. When off-stream chamber pressurized, Purge PRESS Indicator reads SYS PRESS. (Ref. U418762) ☐
- I&C assistance needed for the following step, IF adjustments to be made. ☐

9. **Monitor** each air dryer during regeneration cycle to ensure purge air PRESS 21 to 31 PSIG. IF required, **adjust** purge air PRESS using associated FCV on 1A and/or 1B Air Dryer by performing the following:
   a. **Slowly rotate** 1A Dryer, N1P19F001A Purge Throttle VLV, N1P19V1088E until purge PRESS reads 21 to 31 PSIG on Purge Flow Indicator, N1P19FI565. Throttle VLV, located ≈ 5 inches behind Purge PRESS Indicator, between 2 chambers. Requires screwdriver or similar device to make adjustment. ☐

4.1 COMPRESSED AIR SYS STARTUP, NORMAL OPERATION (continued)

9. (continued)

   b. **Slowly rotate** 1B Dryer, N1P19F001B Purge Throttle VLV, N1P19V1089E until purge PRESS reads 21 to 31 PSIG on Purge Flow Indicator, N1P19FI566. Throttle VLV located ≈ 5 inches behind Purge PRESS Indicator, between 2 chambers. Requires screwdriver or similar device to make adjustment. ☐

10. **Monitor** each air dryer during operation cycle; **verify** proper operation by BLUE color on moisture indicator. ☐

11. **Monitor** SA, IA PRESS', IF necessary to maintain air PRESS' > 88 PSIG, **place** additional SAC(s) in service. ☐

4.2 1A SAC OPERATION

4.2.1 Starting 1A SAC in Local or Remote Following Extended S/D or MAINT

NOTE
This section may also be used for pre-operational checks for 1A SAC. ☐

1. **Start-up** 1A SAC by **performing** the following:

   a. **Obtain** SS permission prior to S/U of 1A SAC in Local or Remote CONT. ☐

   b. **Notify** CRO 1A SAC to be started up. ☐

   c. **Verify** 1A SAC Emergency Stop Button UNLOCKED by **turning** to left. ☐

NOTE
In the following step, IF Emergency Stop required to be reset to clear General Alarm LED, refer to Figure 6 for guidance. ☐

   d. **Verify** 1A SAC General Alarm LED NOT 'ON' ☐

   e. **Check** proper oil level in 1A SAC crankcase. ☐

   f. IF **returning** SA SYS to service, **verify** SW to Air Compressors Combined HDR ISO VLV N1P16V108 OPEN. ☐

   g. **Open** 1A SAC After Cooler Moisture Separator Manual DRN N1P19V1065A to DRN any CNDS. ☐

   h. **Close** 1A SAC After Cooler Moisture Separator MAN DRN N1P19V1065A. ☐

   i. **Open** 1A SAC Intercooler Moisture Separator Manual DRN N1P19V1061A to DRN any CNDS. ☐

   j. **Close** 1A SAC Intercooler Moisture Separator MAN DRN N1P19V1061A. ☐

   k. **Verify** 1A SAC 'Voltage On' LED LIT. ☐

NOTE
SAC skid valves throttled as necessary to maintain SW, air outlet temperatures. If these valves still in position to which they were throttled previous time SAC in operation, valves do not have to be fully opened. ☐

2. IF 1A SAC being started for first time after maintenance, **check** 1A SAC skid valves in their proper position: ☐

N1P16V623A	1A SAC SW REG	**Open**
N1P16V645A	1A SAC After Cooler SW REG	**Open**

4.2.1 Starting 1A SAC in Local or Remote Following Extended S/D or MAINT (continued)

3. **Verify** Internal Mode Loading AND Unloading PRESS settings on 1A SAC LCP, as follows:

   a. **Verify** 1A SAC MCB Hand Switch in OFF. ☐

   b. **Press** F1 until Main Screen appears. ☐

   c. **Press** F1 ('Menu') from Main Screen. ☐

   d. **Press** Scroll Down Key until "Modify Parameters" followed by horizontal arrow. [Tabulator Key] ☐

   e. **Press** Tabulator Key to activate Menu. ☐

   f. **Check** first item, “Parameters”, followed by horizontal arrow. ☐

   g. **Press** Tabulator Key. ☐

   h. **Verify** Loading PRESS 88 PSIG, Unloading PRESS 96 PSIG for 1A SAC. ☐

   i. IF pressures correct, **proceed** to Step 4 below. ☐

   j. IF pressures need adjusting, **perform** the following:

      (1) **Press** F2 (“Modify”) to **change** Loading PRESS setting. ☐

NOTE
F2 (“Limits”) can be used to find limitations for parameter. ☐

      (2) **Use** Scroll Keys to **change** 1A Loading PRESS to 88 PSIG. ☐

      (3) **Press** F1 (“Program”) to program new value OR F3 (“Cancel”). ☐

      (4) **Press** F2 (“Modify”) to **change** Unloading PRESS setting. ☐

      (5) **Use** Scroll Keys to **change** 1A Unloading PRESS to 96 PSIG. ☐

      (6) **Press** F1 (“Program”) to program new value OR F3 (“Cancel”). ☐

4. **Press** F1 until Main Screen appears. ☐

5. **Press and hold** Scroll Up Key to activate “Configurations Menu”. ☐

6. **Scroll** to option 'C.C.M’, **perform** the following:

   a. **Press** F2 ('Mod') to modify. ☐

   b. **Use** Scroll Keys to select LOCAL. ☐

   c. **Press** “PROG” Key. ☐

   d. **Check** 1A SAC number blinks on MCC Screen of 1A SAC PRI REG. ☐

7. **Press** F1 until Main Screen appears. ☐

4.2.1 Starting 1A SAC in Local or Remote Following Extended S/D or MAINT (continued)

NOTE

It may be necessary to manually BLDN 1A Air RCVR < 85 PSIG per Section 4.10 to watch SAC load on Internal Mode PRESS settings. SAC will S/D in ≈ 10 to 15 minutes if no load on SAC. ☐

CAUTION

Procedure verifies SAC operability on Internal Mode PRESS settings; therefore, plant conditions must allow establishment of 1A RCVR PRESS < 85 PSIG. ☐

8. **Press** 1A SAC start button. ☐
9. **Verify** 1A SAC starts, loads, unloads as programmed on its Internal Mode PRESS settings. ☐
10. IF pre-operational check, **press** 1A SAC stop button. ☐
11. **Press and hold** Scroll Up Key to activate “Configurations Menu”. ☐
12. **Scroll** to option 'C.C.M’, **perform** the following: ☐
    a. **Press** F2 ('Mod') to modify. ☐
    b. **Use** Scroll Keys to select REMOTE. [MCB] ☐
    c. **Press** “PROG” Key. ☐
    d. **Check** 1A SAC number blinks on MCC Screen of 1A SAC PRI REG. ☐
13. **Press** F1 until Main Screen appears. ☐
14. **Notify** CONT RM 1A SAC in REMOTE CONTROL. ☐
15. **Place** MCB H/S for 1A Air Compressor to AUTO. ☐
16. **Verify** 1A SAC starts, loads, unloads as programmed on its Internal Mode PRESS settings. ☐
17. Leave 1A SAC in Remote on MCB OR **proceed** to Section 4.6.1 to integrate 1A SAC onto SEQ. ☐

4.2.2 MCB Shutdown of 1A SAC

NOTE

1B AND 1C SACs must be isolated from SEQ per Section 4.8.2 AND Section 4.8.3, placed in Remote CONT (MCB) IF removing power from 1A SAC. [BKR open] ☐

1. IF 1A SAC previously selected to MCB control, **go to** Step 3. ☐
2. **Isolate** 1A SAC from sequencer as follows:
   a. **Obtain** SS permission to isolate 1A SAC from sequencer. ☐
   b. **Notify** Control Room of intent to isolate 1A SAC from sequencer. ☐
   c. **Perform** the following at 1A SAC:
      (1) **Press** F1 until Main Screen appears. ☐
      (2) **Press and hold** Scroll Up Key to activate “Configurations Menu”. ☐
      (3) **Scroll** to option 'C.C.M’. ☐
      (4) To modify, **press** F2 ('Mod'). ☐
      (5) **Use** Scroll Keys to **select** Remote. [MCB] ☐
      (6) **Press** “PROG” Key. ☐
      (7) **Check** 1A SAC number blinks on MCC Screen of 1A SAC PRI REG. ☐
   d. **Notify** Control Room 1A SAC in REMOTE CONTROL. ☐
3. On MCB, **place** 1A Air Compressor H/S to OFF. ☐

4.2.3 MCB Startup of 1A SAC

1. IF 1A SAC shutdown for long duration such as maintenance or tagging **go to** Section 4.2.1. ☐
2. IF 1A SAC shutdown for short duration AND no configuration changes made, **place** 1A Air Compressor H/S to AUTO. ☐
3. IF desired, **perform** one of the following:
   - IF 1A SAC shutdown for short duration AND no configuration changes made, go to Section 4.9.1, Re-Integration of 1A SAC to SEQ. ☐
   - Integrate 1A SAC on sequencer **per** Section 4.6.1. ☐

4.3 1B SAC OPERATION

4.3.1 Starting 1B SAC in Local or Remote Following Extended S/D or MAINT

NOTE
This section may also be used for pre-operational checks for 1B SAC. ☐

1. **Start-up** 1B SAC by **performing** the following:

   a. **Obtain** SS permission prior to S/U of 1B SAC in Local or Remote CONT. ☐

   b. **Notify** CRO 1B SAC to be started up. ☐

   c. **Verify** 1B SAC Emergency Stop Button UNLOCKED by **turning** to left. ☐

NOTE
In the following step, IF Emergency Stop required to be reset to clear General Alarm LED, refer to Figure 6 for guidance. ☐

   d. **Verify** 1B SAC General Alarm LED NOT 'ON' ☐

   e. **Check** proper oil level in 1B SAC crankcase. ☐

   f. IF **returning** SA SYS to service, **verify** SW to Air Compressors Combined HDR ISO VLV N1P16V108 OPEN. ☐

   g. **Open** 1B SAC After Cooler Moisture Separator Manual DRN N1P19V1065B to DRN any CNDS. ☐

   h. **Close** 1B SAC After Cooler Moisture Separator MAN DRN N1P19V1065B. ☐

   i. **Open** 1B SAC Intercooler Moisture Separator Manual DRN N1P19V1061B to DRN any CNDS. ☐

   j. **Close** 1B SAC Intercooler Moisture Separator MAN DRN N1P19V1061B. ☐

   k. **Verify** 1B SAC 'Voltage On' LED LIT. ☐

NOTE
SAC skid valves throttled as necessary to maintain SW, air outlet temperatures. If these valves still in position to which they were throttled previous time SAC in operation, valves do not have to be fully opened. ☐

2. IF 1B SAC being started for first time after maintenance, **check** 1B SAC skid valves in their proper position: ☐

N1P16V623B	1B SAC SW REG	**Open**
N1P16V645B	1B SAC After Cooler SW REG	**Open**

4.3.1 Starting 1B SAC in Local or Remote Following Extended S/D or MAINT (continued)

3. **Verify** Internal Mode Loading AND Unloading PRESS settings on 1B SAC LCP, as follows:

   a. **Verify** 1B SAC MCB Hand Switch in OFF. ☐

   b. **Press** F1 until Main Screen appears. ☐

   c. **Press** F1 ('Menu') from Main Screen. ☐

   d. **Press** Scroll Down Key until "Modify Parameters" followed by horizontal arrow. [Tabulator Key] ☐

   e. **Press** Tabulator Key to activate Menu. ☐

   f. **Check** first item, “Parameters”, followed by horizontal arrow. ☐

   g. **Press** Tabulator Key. ☐

   h. **Verify** Loading PRESS 92 PSIG, Unloading PRESS 100 PSIG for 1B SAC. ☐

   i. IF pressures correct, **proceed** to Step 4 below. ☐

   j. IF pressures need adjusting, **perform** the following:

      (1) **Press** F2 (“Modify”) to **change** Loading PRESS setting. ☐

NOTE
F2 (“Limits) can be used to find limitations for parameter. ☐

      (2) **Use** Scroll Keys to **change** 1B Loading PRESS to 92 PSIG. ☐

      (3) **Press** F1 (“Program”) to program new value OR F3 (“Cancel”). ☐

      (4) **Press** F2 (“Modify”) to **change** Unloading PRESS setting. ☐

      (5) **Use** Scroll Keys to **change** 1B Unloading PRESS to 100 PSIG. ☐

      (6) **Press** F1 (“Program”) to program new value OR F3 (“Cancel”). ☐

4. **Press** F1 until Main Screen appears. ☐

5. **Press and hold** Scroll Up Key to activate “Configurations Menu”. ☐

6. **Scroll** to option 'C.C.M’, **perform** the following: ☐

   a. **Press** F2 ('Mod') to modify. ☐

   b. **Use** Scroll Keys to select LOCAL. ☐

   c. **Press** “PROG” Key. ☐

   d. **Check** 1B SAC number blinks on MCC Screen of 1A SAC PRI REG. ☐

7. **Press** F1 until Main Screen appears. ☐

4.3.1 Starting 1B SAC in Local or Remote Following Extended S/D or MAINT (continued)

NOTE

It may be necessary to manually BLDN 1B1 AND 1B2 Air RCVRs < 90 PSIG per Section 4.10 to watch SAC load on Internal Mode PRESS settings. SAC will S/D in ≈ 10 to 15 minutes if no load on SAC. ☐

CAUTION

Procedure verifies SAC operability on Internal Mode PRESS settings; therefore, plant conditions must allow establishment of 1B1 AND 1B2 RCVR PRESS < 90 PSIG. ☐

8. **Press** 1B SAC start button. ☐
9. **Verify** 1B SAC starts, loads, unloads as programmed on its Internal Mode PRESS settings. ☐
10. IF pre-operational check, **press** 1B SAC stop button. ☐
11. **Press and hold** Scroll Up Key to activate “Configurations Menu”. ☐
12. **Scroll** to option 'C.C.M’, **perform** the following: ☐
    a. **Press** F2 ('Mod') to modify. ☐
    b. **Use** Scroll Keys to select REMOTE. [MCB] ☐
    c. **Press** “PROG” Key. ☐
    d. **Check** 1B SAC number blinks on MCC Screen of 1A SAC PRI REG. ☐
13. **Press** F1 until Main Screen appears. ☐
14. **Notify** CONT RM 1B SAC in REMOTE CONTROL. ☐
15. **Place** MCB H/S for 1B Air Compressor to AUTO. ☐
16. **Verify** 1B SAC starts, loads, unloads as programmed on its Internal Mode PRESS settings. ☐
17. Leave 1B SAC in Remote on MCB OR **proceed** to Section 4.6.2 to integrate 1B SAC on SEQ. ☐

4.3.2 MCB Shutdown of 1B SAC

1. IF 1B SAC previously selected to MCB control, **go to** Step 3. ☐
2. **Isolate** 1B SAC from sequencer as follows:
   a. **Obtain** SS permission to isolate 1B SAC from sequencer. ☐
   b. **Notify** Control Room of intent to isolate 1B SAC from sequencer. ☐
   c. At 1B SAC, **perform** the following:
      (1) **Press** F1 until Main Screen appears. ☐
      (2) **Press and hold** Scroll Up Key to activate “Configurations Menu”. ☐
      (3) **Scroll** to option 'C.C.M’. ☐
      (4) To modify, **press** F2 ('Mod'). ☐
      (5) **Use** Scroll Keys to **select** Remote. [MCB] ☐
      (6) **Press** “PROG” Key. ☐
      (7) **Check** 1B SAC number blinks on MCC Screen of 1A SAC PRI REG. ☐
   d. **Notify** Control Room 1B SAC in REMOTE CONTROL. ☐
3. On MCB, **place** 1B Air Compressor H/S to OFF. ☐

4.3.3 MCB Startup of 1B SAC

1. IF 1B SAC shutdown for long duration such as maintenance or tagging **go to** Section 4.3.1. ☐
2. IF 1B SAC shutdown for short duration AND no configuration changes made, **place** 1B Air Compressor H/S to AUTO. ☐
3. IF desired, **perform** one of the following:
   - IF 1B SAC shutdown for short duration AND no configuration changes made, go to Section 4.9.2, Re-Integration of 1B SAC to SEQ. ☐
   - Integrate 1B SAC on sequencer **per** Section 4.6.2. ☐

4.4 1C SAC OPERATION

4.4.1 Starting 1C SAC in Local or Remote Following Extended S/D or MAINT

NOTE

This section may also be used for pre-operational checks for 1C SAC. ☐

1. **Start-up** 1C SAC by **performing** the following:

   a. **Obtain** SS permission prior to S/U of 1C SAC in Local or Remote CONT. ☐

   b. **Notify** CRO 1C SAC to be started up. ☐

   c. **Verify** 1C SAC Emergency Stop Button UNLOCKED by **turning** to left. ☐

NOTE

In the following step, IF Emergency Stop required to be reset to clear General Alarm LED, refer to Figure 6 for guidance. ☐

   d. **Verify** 1C SAC General Alarm LED NOT 'ON' ☐

   e. **Check** proper oil level in 1C SAC crankcase. ☐

   f. IF **returning** SA SYS to service, **verify** SW To Air Compressors Combined HDR ISO VLV N1P16V108 OPEN. ☐

   g. **Open** 1C SAC After Cooler Moisture Separator Manual DRN N1P19V1065C to DRN any CNDS. ☐

   h. **Close** 1C SAC After Cooler Moisture Separator MAN DRN N1P19V1065C. ☐

   i. **Open** 1C SAC Intercooler Moisture Separator Manual DRN N1P19V1061C to DRN any CNDS. ☐

   j. **Close** 1C SAC Intercooler Moisture Separator MAN DRN N1P19V1061C. ☐

   k. **Verify** 1C SAC 'Voltage On' LED LIT. ☐

NOTE

SAC skid valves throttled as necessary to maintain SW, air outlet temperatures. If these valves still in position to which they were throttled previous time SAC in operation, valves do not have to be fully opened. ☐

2. IF 1C SAC being started for first time after maintenance, **check** 1C SAC skid valves in their proper position: ☐

N1P16V623C	1C SAC SW REG	**Open**
N1P16V645C	1C SAC AFTER COOLER SW REG	**Open**

4.4.1 Starting 1C SAC in Local or Remote Following Extended S/D or MAINT (continued)

3. **Verify** Internal Mode Loading AND Unloading PRESS settings on 1C SAC LCP, as follows:
   - a. **Verify** 1C SAC MCB Hand Switch in OFF. ☐
   - b. **Press** F1 until Main Screen appears. ☐
   - c. **Press** F1 ('Menu') from Main Screen. ☐
   - d. **Press** Scroll Down Key until "Modify Parameters" followed by horizontal arrow. (Tabulator Key) ☐
   - e. **Press** Tabulator Key to activate Menu. ☐
   - f. **Check** first item, “Parameters”, followed by horizontal arrow. ☐
   - g. **Press** Tabulator Key. ☐
   - h. **Verify** Loading PRESS 90 PSIG, Unloading PRESS 98 PSIG for 1C SAC ☐
   - i. IF pressures correct, **proceed** to Step 4 below. ☐
   - j. IF pressures need adjusting, **perform** the following:
     - (1) **Press** F2 (“Modify”) to **change** Loading PRESS setting. ☐

NOTE
F2 (“Limits”) can be used to find limitations for parameter. ☐

     - (2) **Use** Scroll Keys to **change** 1C Loading PRESS to 90 PSIG. ☐
     - (3) **Press** F1 (“Program”) to program new value or F3 (“Cancel”). ☐
     - (4) **Press** F2 (“Modify”) to **change** Unloading PRESS setting. ☐
     - (5) **Use** Scroll Keys to **change** 1C Unloading PRESS to 98 PSIG. ☐
     - (6) **Press** F1 (“Program”) to program new value or F3 (“Cancel”). ☐
4. **Press** F1 until Main Screen appears. ☐
5. **Press and hold** Scroll Up Key to activate “Configurations Menu”. ☐
6. **Scroll** to option 'C.C.M’, **perform** the following: ☐
   - a. **Press** F2 ('Mod') to modify. ☐
   - b. **Use** Scroll Keys to select LOCAL. ☐
   - c. **Press** “PROG” Key. ☐
   - d. **Check** 1C SAC number blinks on MCC Screen of 1A SAC PRI REG. ☐
7. **Press** F1 until Main Screen appears. ☐

4.4.1 Starting 1C SAC in Local or Remote Following Extended S/D or MAINT (continued)

NOTE

It may be necessary to manually BLDN 1C Air RCVR < 87 PSIG per Section 4.10 to watch SAC load on Internal Mode PRESS settings. SAC will S/D in ≈ 10 to 15 minutes if no load on SAC. ☐

CAUTION

Procedure verifies SAC operability on Internal Mode PRESS settings; therefore, plant conditions must allow establishment of 1C RCVR PRESS < 87 PSIG. ☐

8. **Press** 1C SAC start button. ☐
9. **Verify** 1C SAC starts, loads, unloads as programmed on its Internal Mode PRESS settings. ☐
10. IF pre-operational check, **press** 1C SAC stop button. ☐
11. **Press and hold** Scroll Up Key to activate “Configurations Menu”. ☐
12. **Scroll** to option 'C.C.M’, **perform** the following: ☐
    a. **Press** F2 ('Mod') to modify. ☐
    b. **Use** Scroll Keys to select REMOTE. [MCB] ☐
    c. **Press** “PROG” Key. ☐
    d. **Check** 1C SAC number blinks on MCC Screen of 1A SAC PRI REG. ☐
13. **Press** F1 until Main Screen appears. ☐
14. **Notify** CONT RM 1C SAC in REMOTE. ☐
15. **Place** MCB H/S for 1C Air Compressor to AUTO. ☐
16. **Verify** 1C SAC starts, loads, unloads as programmed on its Internal Mode PRESS settings. ☐
17. Leave 1C SAC in Remote CONT on MCB OR **proceed** to Section 4.6.3 to integrate 1C SAC onto SEQ. ☐

4.4.2 MCB Shutdown of 1C SAC

1. IF 1C SAC previously selected to MCB control, **go to** Step 3. ☐
2. **Isolate** 1C SAC from sequencer as follows:
   a. **Obtain** SS permission to isolate 1C SAC from sequencer. ☐
   b. **Notify** Control Room of intent to isolate 1C SAC from sequencer. ☐
   c. At 1C SAC, **perform** the following:
      (1) **Press** F1 until Main Screen appears. ☐
      (2) **Press and hold** Scroll Up Key to activate “Configurations Menu”. ☐
      (3) **Scroll** to option 'C.C.M’. ☐
      (4) To modify, **press** F2 ('Mod'). ☐
      (5) **Use** Scroll Keys to **select** Remote. [MCB] ☐
      (6) **Press** “PROG” Key. ☐
      (7) **Check** 1C SAC number blinks on MCC Screen of 1A SAC PRI REG. ☐
   d. **Notify** Control Room 1C SAC in REMOTE CONTROL. ☐
3. On MCB, **place** 1C Air Compressor H/S to OFF. ☐

4.4.3 MCB Startup of 1C SAC

1. IF 1C SAC shutdown for long duration such as maintenance or tagging **go to** Section 4.4.1. ☐
2. IF 1C SAC shutdown for short duration AND no configuration changes made, **place** 1C Air Compressor H/S to AUTO. ☐
3. IF desired, **perform** one of the following:
   - IF 1C SAC shutdown for short duration AND no configuration changes made, go to Section 4.9.3, Re-Integration of 1C SAC to SEQ. ☐
   - Integrate 1C SAC on sequencer **per** Section 4.6.3. ☐

NOTES

- 1A SAC controller (PRI REG) acts as sequencer for SACs. ES4i functionality (also referred to as MCC, Multi COMPR CONT) an integrated feature of MKIV REG, on 1A SAC display PNL, shown as “MCC”. ☐
- SACs controlled are connected with each other in Local Area Network (LAN). After activating ES4i, all local start, stop functions on LCPs of SACs are disabled (except for EMERG Stop Buttons which remain active). ☐
- After pressing start button on 1A SAC, PRI REG will start, load, unload, stop selected SACs based on run time, PRI REG outlet PRESS input, PRESS range programmed into PRI REG. ☐
- SACs “isolated” from MCC network, have their COMPR CONT Mode (C.C.M.) set to Local or Remote CONT (MCB) will run, load, unload,, stop based on their own internal PRESS switch (PRESS XMTR PT600A, B or C), MIN/MAX setpoints programmed into their respected LCP. ☐
- Three function Keys (F1, F2, F3) under display screen on SAC LCP used to select various functions when programming SAC. Actual function of each function Key indicated on bottom line of display screen just above relevant Function Key. Three Scroll Keys (↑, ↓, →) to right of display used navigate to Menu items, navigate to sub-menus, change various setpoints. → Key called “Tabulator”. ☐

4.5 SEQUENCER SETUP, OPERATION

4.5.1 Activating Sequencer on 1A SAC Primary Regulator

1. **Activate** SEQ on 1A SAC PRI REG, **perform** the following:

   a. **Inform** SS, CRO, SEQ to be setup for operation. ☐

   b. **Verify** 1A SAC ‘Voltage On’ LED LIT. ☐

   c. **Press** F1 until Main Screen appears. ☐

   d. **Press and hold** Scroll Up Key to activate “Configurations Menu”. ☐

   e. **Scroll** to option 'M.C.C.' ☐

NOTE

By default, text 'Not Activated', blinking. ☐

   f. **Verify** text shows “Active”, IF not, **perform** the following: ☐

   g. **Press** F2 (‘Mod’) to **change** setting. ☐

   h. **Use** Scroll Keys to change setting to “ACTIVATED”. ☐

   i. **Press** F1 (‘PROG’) to save modification or F3 (“Cancel”). ☐

   j. **Press** 1A SAC start button if needed to have PRI REG take CONT of SACs in LAN or to be placed in LAN. ☐

   k. **Press** F1 until Main Screen appears. ☐

   l. **Notify** CONT RM SEQ ACTIVATED. ☐

4.5.2 Verifying Number of SACs Selected in LAN

1. **Verify** SACs selected in LAN by **performing** the following:

   a. **Notify** SS, CRO, number of SACs to be selected in LAN. ☐

   b. **Press** F1 until Main Screen appears on 1A SAC PRI REG. ☐

   c. **Press** F1 ('Menu') from Main Screen. ☐

   d. **Use** Scroll Keys, **Scroll** to option 'Modify Params'. ☐

   e. **Press** horizontal arrow key to select. [Tabulator] ☐

   f. **Scroll** to option ‘Parameters MCC’. ☐

   g. **Press** Tabulator Key to select. ☐

   h. **Verify** number 3 (or number requested by SS), shown on screen. ☐

   i. IF number not shown, **perform** the following:

      (1) **Press** F2 (‘Mod’) to change setting. ☐

      (2) **Use** Scroll Keys to change number of SACs in LAN to 3 (or to number requested by SS). ☐

      (3) **Press** F1 (‘PROG’) to save selected value or F3 (“Cancel”). ☐

   j. **Press** F1 until Main Screen appears. ☐

   k. **Notify** CONT RM, number of SACs selected in LAN. ☐

4.5.3 Verifying Pressure Control Band 1 on SEQ

1. **Verify** PRESS CONT Band 1 by **performing** the following:

   a. **Notify** SS, CRO, PRESS CONT Band 1 on SEQ to be CHECKED. ☐

   b. **Press** F1 until Main Screen appears on 1A SAC PRI REG. ☐

   c. **Press** F1 ('Menu') from Main Screen. ☐

   d. **Use** Scroll Keys, **Scroll** to option 'Modify Params'. ☐

   e. **Press** horizontal arrow key to select. [Tabulator] ☐

   f. **Scroll** to option ‘Parameters MCC’. ☐

   g. **Press** Tabulator Key to select. ☐

   h. **Verify** ‘MIN PRESS Band 1’ **indicates** 92 PSIG. ☐

   i. IF MIN PRESS Band 1’ does not indicates 92 PSIG, **perform** the following:

      (1) **Verify** right side SEL mark at ‘MIN PRESS Band 1’. ☐

      (2) **Press** F2 (‘Mod’) to change setting. ☐

      (3) **Use** Scroll Keys to change PRESS to 92 PSIG. ☐

      (4) **Press** F1 (‘PROG’) to save selected value or F3 (“Cancel”). ☐

   j. **Scroll**, **verify** ‘MAX PRESS Band 1’ **indicates** 100 PSIG. ☐

   k. IF MAX PRESS Band 1’ does not indicates 100 PSIG, **perform** the following with SS’ permission:

      (1) **Verify** right side SEL mark at ‘MAX PRESS Band 1’. ☐

      (2) **Press** F2 (‘Mod’) to modify. ☐

      (3) **Use** Scroll Keys to change PRESS to 100 PSIG. ☐

      (4) **Press** F1 (‘PROG’) to save selected value or F3 (“Cancel”). ☐

   l. **Press** F1 until Main Screen appears. ☐

   m. **Notify** CONT RM, PRESS CONT Band 1 on SEQ verified or changed. ☐

NOTES

- SACs run hours should be zeroed on SEQ (1A SAC PRI REG) prior to integration if SAC has been S/D for long time. ☐
- SEQ balances run hours when in control. ☐

4.5.4 Zeroing SAC Run Hours on SEQ

1. **Zero** run hours on SEQ (1A SAC PRI REG),by **performing** the following:
   - a. **Notify** SS, CRO, which SAC(s) run hours to be zeroed. ☐
   - b. **Press** F1 until Main Screen appears on 1A SAC. ☐
   - c. **Press** F1 ('Menu') from Main Screen. ☐
   - d. **Use** Scroll Keys, **Scroll** to option 'Modify Params'. ☐
   - e. **Press** horizontal arrow key to select. [Tabulator] ☐
   - f. **Scroll** to option ‘Parameters MCC’. ☐
   - g. **Press** Tabulator Key to select. ☐
   - h. **Scroll** to 1A OR 1B OR 1C SAC Run Hours. ☐
     - (1) For 1A SAC, **perform** the following:
       - (a) **Verify** right side SEL mark at 1A SAC Run Hours. ☐
       - (b) **Press** F2 (‘Mod’) to modify. ☐
       - (c) **Scroll** Run Hours to 0. [keep pushed, hours will reach 0 fast] ☐
       - (d) **Press** F1 (‘PROG’) to save value or F3 (“Cancel”). ☐
     - (2) For 1B SAC, **perform** the following:
       - (a) **Verify** right side SEL mark at 1B SAC Run Hours. ☐
       - (b) **Press** F2 (‘Mod’) to modify. ☐
       - (c) **Scroll** Run Hours to 0. [keep pushed, hours will reach 0 fast] ☐
       - (d) **Press** F1 (‘PROG’) to save value or F3 (“Cancel”). ☐
     - (3) For 1C SAC, **perform** the following:
       - (a) **Verify** right side SEL mark at 1C SAC Run Hours. ☐
       - (b) **Press** F2 (‘Mod’) to modify. ☐
       - (c) **Scroll** Run Hours to 0. [keep pushed, hours will reach 0 fast] ☐
       - (d) **Press** F1 (‘PROG’) to save value or F3 (“Cancel”). ☐
   - i. **Press** F1 until Main Screen appears. ☐
   - j. **Notify** CONT RM SACs run hours zeroed. ☐

4.6 INTEGRATION OF 1A OR 1B OR 1C SAC TO SEQUENCER

NOTE

IF 1A SAC shutdown for short duration AND no configuration changes made, go to Section 4.9.1, Re-Integration of 1A SAC to SEQ. ☐

4.6.1 Integrating 1A SAC to SEQ

1. **Integrate** 1A SAC to SEQ (1A SAC PRI REG), by **performing** the following:
   - a. **Obtain** SS permission prior to integrating 1A SAC to SEQ. ☐
   - b. **Notify** CRO 1A SAC to be **integrated** to SEQ. ☐
   - c. **Verify** 1A SAC setup COMPLETE. [Section 4.2.1] ☐
   - d. **Verify** SEQ setup COMPLETE. [Section 4.5] ☐
   - e. **Verify** 1A SAC Automatic Operation LED LIT. ☐
   - f. **Press** F1 until Main Screen appears. ☐
   - g. **Press and hold** Scroll Up Key to activate “Configurations Menu”. ☐
   - h. **Scroll** to option 'C.C.M’. ☐
   - i. **Press** Key F2 ('Mod') to change setting. ☐
   - j. **Use** Scroll Keys to **select** 'LAN Control' or F3 (‘Cancel’). ☐
   - k. **Press** “PROG” Key to save or F3 (‘Cancel’). ☐

NOTE

Recommended to set 1A SAC REG Node to number 1 in configuration. ☐

   - l. **Verify** Node ID for 1A SAC set to 1 in its “Configurations Menu” ☐
   - m. IF Node ID not set, **perform** the following:
     - (1) **Scroll** to option 'Node ID'. ☐
     - (2) **Press** F2 ('Mod'), **use** Scroll Keys to select number 1 for 1A SAC. ☐
     - (3) **Press** ('PROG') Key to confirm modification. ☐
   - n. **Press** F1 until Main Screen appears. ☐
   - o. **Press** F2 on 1A SAC to activate MCC Screen. ☐

NOTE

1A SAC PRI REG will take CONT of 1A SAC. ☐

   - p. **Press** “Reset” Key on MCC Screen of 1A SAC PRI REG. ☐
   - q. **Notify** CONT RM 1A SAC integrated to SEQ. ☐

NOTE

IF 1B SAC shutdown for short duration AND no configuration changes made, go to Section 4.9.2, Re-Integration of 1B SAC to SEQ. ☐

4.6.2 Integrating 1B SAC to SEQ

1. **Integrate** 1B SAC to SEQ (1A SAC PRI REG), by **performing** the following:

   a. **Obtain** SS permission prior to integrating 1B SAC to SEQ. ☐

   b. **Notify** CRO 1B SAC to be **integrated** to SEQ. ☐

   c. **Verify** 1B SAC setup COMPLETE. [Section 4.3.1] ☐

   d. **Verify** SEQ setup COMPLETE. [Section 4.5] ☐

   e. **Verify** 1B SAC Automatic Operation LED LIT. ☐

   f. **Press** F1 until Main Screen appears. ☐

   g. **Press and hold** Scroll Up Key to activate “Configurations Menu”. ☐

   h. **Scroll** to option 'C.C.M’. ☐

   i. **Press** Key F2 ('Mod') to change setting. ☐

   j. **Use** Scroll Keys to **select** 'LAN Control or F3 (‘Cancel’). ☐

   k. **Press** “PROG” Key to save or F3 (‘Cancel’). ☐

NOTE

Recommended to set 1B SAC REG Node to number 2 in configuration. ☐

   l. **Verify** Node ID for 1B SAC set to 2 in its “Configurations Menu” ☐

   m. IF Node ID not set, **perform** the following:

      (1) **Scroll** to option 'Node ID'. ☐

      (2) **Press** F2 ('Mod'), **use** Scroll Keys to select number 2 for 1B SAC. ☐

      (3) **Press** ('PROG') Key to confirm modification. ☐

   n. **Press** F1 until Main Screen appears. ☐

   o. **Press** F2 on 1A SAC to activate MCC Screen. ☐

NOTE

1A SAC PRI REG will take CONT of 1B SAC. ☐

   p. **Press** “Reset” Key on MCC Screen of 1A SAC PRI REG. ☐

   q. **Notify** CONT RM 1B SAC integrated to SEQ. ☐

NOTE

IF 1C SAC shutdown for short duration AND no configuration changes made, go to Section 4.9.3, Re-Integration of 1C SAC to SEQ. ☐

4.6.3 Integrating 1C SAC to SEQ

1. **Integrate** 1C SAC to SEQ (1A SAC PRI REG), by **performing** the following:

   a. **Obtain** SS permission prior to integrating 1C SAC to SEQ. ☐

   b. **Notify** CRO 1C SAC to be **integrated** to SEQ. ☐

   c. **Verify** 1C SAC setup COMPLETE. [Section 4.4.1] ☐

   d. **Verify** SEQ setup COMPLETE. [Section 4.5] ☐

   e. **Verify** 1C SAC Automatic Operation LED LIT. ☐

   f. **Press** F1 until Main Screen appears. ☐

   g. **Press and hold** Scroll Up Key to activate “Configurations Menu”. ☐

   h. **Scroll** to option 'C.C.M’. ☐

   i. **Press** Key F2 ('Mod') to change setting. ☐

   j. **Use** Scroll Keys to **select** 'LAN Control' or F3 (‘Cancel’). ☐

   k. **Press** “PROG” Key to save or F3 (‘Cancel’). ☐

NOTE

Recommended to set 1C SAC REG Node to number 3 in configuration. ☐

   l. **Verify** Node ID for 1C SAC set to 3 in its “Configurations Menu” ☐

   m. IF Node ID not set, **perform** the following:

      (1) **Scroll** to option 'Node ID'. ☐

      (2) **Press** F2 ('Mod'), **use** Scroll Keys to select number 3 for 1C SAC. ☐

      (3) **Press** ('PROG') Key to confirm modification. ☐

   n. **Press** F1 until Main Screen appears. ☐

   o. **Press** F2 on 1A SAC to activate MCC Screen. ☐

NOTE

1A SAC PRI REG will take CONT of 1C SAC. ☐

   p. **Press** “Reset” Key on MCC Screen of 1A SAC PRI REG. ☐

   q. **Notify** CONT RM 1C SAC integrated to SEQ. ☐

4.7 DURING OPERATION

This section for checking SAC status if warranted.

NOTE

PRI REG screen shows PRESS AND each SAC status. ☐

1. **Press** F2 ('MCC') from Main Screen on 1A SAC PRI REG to activate "MCC Menu"(SEQ). ☐
2. **Press** F2 ('Reset'), if needed, to allow SEQ to re-establish communications with "LAN" connected SACs. ☐
3. **Press** Scroll Down Key to show net PRESS, PRI REG regulating SACs connected to LAN. ☐
4. **Press** Scroll Up Key to return to previous screen. ☐
5. **Press** F1 to return to Main Screen or Main Menu. Main Screen shows 1A SAC outlet PRESS AND its current status. ☐
6. **Press** F1 ('Main Screen') on each SACs to allow Scrolling through Menus to call up SAC Data. ☐

CAUTION

1B AND 1C SACs must be isolated from SEQ per Section 4.8.2 AND Section 4.8.3, placed in Remote CONT (MCB) IF removing power from 1A SAC. [BKR open] ☐

4.8 ISOLATING 1A OR 1B OR 1C SAC FROM SEQ

4.8.1 Isolating 1A SAC From SEQ

1. **Isolate** 1A SAC from SEQ (1A SAC PRI REG) by **performing** the following:

   a. **Obtain** SS permission prior to isolating 1A SAC from SEQ. ☐

   b. **Notify** CRO 1A SAC to be isolated from SEQ. ☐

   c. IF power to be removed from 1A SAC, **place** 1B AND 1C SACs in Remote per Section 4.8.2 AND Section 4.8.3 FIRST. ☐

   d. **Press** F1 until Main Screen appears. ☐

   e. **Press and hold** Scroll Up Key to activate “Configurations Menu”. ☐

   f. **Scroll** to option 'C.C.M’. ☐

   g. **Press** F2 ('Mod') to modify. ☐

   h. **Use** Scroll Keys to **select** Remote. [MCB] ☐

   i. **Press** “PROG” Key. ☐

   j. **Check** 1A SAC number blinks on MCC screen of 1A SAC PRI REG. ☐

   k. **Notify** CONT RM 1A SAC isolated, in REMOTE. ☐

NOTE

It may be necessary to manually BLDN 1A Air RCVR per Section 4.10 to < 85 PSIG in order to watch SAC load on Internal Mode PRESS settings. SAC will S/D in ≈ 10-15 minutes if no load on SAC. ☐

CAUTION

Procedure verifies SAC operability on Internal Mode PRESS settings; therefore, plant conditions must allow establishment of 1A RCVR PRESS < 85 PSIG. ☐

   l. Have CRO **take** 1A SAC H/S to AUTO to verify proper operation. ☐

4.8.2 Isolating 1B SAC From SEQ

1. **Isolate** 1B SAC from SEQ (1A SAC PRI REG) by **performing** the following:

   a. **Obtain** SS permission prior to isolating 1B SAC from SEQ. ☐

   b. **Notify** CRO 1B SAC to be isolated from SEQ. ☐

   c. **Press** F1 until Main Screen appears. ☐

   d. **Press and hold** Scroll Up Key to activate “Configurations Menu”. ☐

   e. **Scroll** to option 'C.C.M’. ☐

   f. **Press** F2 ('Mod') to modify. ☐

   g. **Use** Scroll Keys to **select** Remote. [MCB] ☐

   h. **Press** “PROG” Key. ☐

   i. **Check** 1B SAC number blinks on MCC screen of 1A SAC PRI REG. ☐

   j. **Notify** CONT RM 1B SAC isolated, in REMOTE. ☐

NOTE

It may be necessary to manually BLDN 1B1 AND 1B2 Air RCVRs < 90 PSIG per Section 4.10 to watch SAC load on Internal Mode PRESS settings. SAC will S/D in ≈ 10 to 15 minutes if no load on SAC. ☐

CAUTION

Procedure verifies SAC operability on Internal Mode PRESS settings; therefore, plant conditions must allow establishment of 1B1 AND 1B2 Air RCVRs < 90 PSIG. ☐

   k. Have CRO **take** 1B SAC H/S to AUTO to verify proper operation. ☐

4.8.3 Isolating 1C SAC From SEQ

1. **Isolate** 1C SAC from SEQ (1A SAC PRI REG) by **performing** the following:

   a. **Obtain** SS permission prior to isolating 1C SAC from SEQ. ☐

   b. **Notify** CRO 1C SAC to be isolated from SEQ. ☐

   c. **Press** F1 until Main Screen appears. ☐

   d. **Press and hold** Scroll Up Key to activate “Configurations Menu”. ☐

   e. **Scroll** to option 'C.C.M’. ☐

   f. **Press** F2 ('Mod') to modify. ☐

   g. **Use** Scroll Keys to **select** Remote. [MCB] ☐

   h. **Press** “PROG” Key. ☐

   i. **Check** 1C SAC number blinks on MCC screen of 1A SAC PRI REG. ☐

   j. **Notify** CONT RM 1C SAC isolated, in REMOTE. ☐

NOTE

It may be necessary to manually BLDN 1C Air RCVR < 87 PSIG per Section 4.10 to watch SAC load on Internal Mode PRESS settings. SAC will S/D in ≈ 10 to 15 minutes if no load on SAC. ☐

CAUTION

Procedure verifies SAC operability on Internal Mode PRESS settings; therefore, plant conditions must allow establishment of 1C Air RCVR < 87 PSIG. ☐

   k. Have CRO **take** 1C SAC H/S to AUTO to verify proper operation. ☐

4.9 RE-INTEGRATION OF 1A OR 1B OR 1C SAC TO SEQ

4.9.1 Re-Integrating 1A SAC to SEQ

1. **Re-integrate** 1A SAC to SEQ (1A SAC PRI REG) by **performing** the following:

   a. **Obtain** SS permission prior to re-integrating 1A SAC to SEQ. ☐

   b. **Notify** CRO 1A SAC to be re-integrated to SEQ. ☐

   c. **Verify** 1A SAC Automatic Operation LED LIT. ☐

   d. **Press** F1 until Main Screen appears. ☐

   e. **Press and hold** Scroll Up Key to activate “Configurations Menu”. ☐

   f. **Scroll** to option 'C.C.M’. ☐

   g. **Press** F2 ('Mod') to modify. ☐

   h. **Use** Scroll Keys to select 'LAN Control'. ☐

   i. **Press** “PROG” Key. ☐

   j. **Press** F1 until Main Screen appears. ☐

   k. **Press** F2 (‘MCC’) on 1A SAC. ☐

NOTE

1A SAC PRI REG will take CONT of 1A SAC. ☐

   l. **Press** “Reset” Key on MCC Screen of 1A SAC PRI REG to allow SEQ to re-establish communications with 1A SAC. ☐

   m. **Notify** CONT RM 1A SAC re-integrated to SEQ. ☐

4.9.2 Re-Integrating 1B SAC to SEQ

1. **Re-integrate** 1B SAC to SEQ (1A SAC PRI REG) by **performing** the following:

   a. **Obtain** SS permission prior to re-integrating 1B SAC to SEQ. ☐

   b. **Notify** CRO 1B SAC to be re-integrated to SEQ. ☐

   c. **Verify** 1B SAC Automatic Operation LED LIT. ☐

   d. **Press** F1 until Main Screen appears. ☐

   e. **Press and hold** Scroll Up Key to activate “Configurations Menu”. ☐

   f. **Scroll** to option 'C.C.M’. ☐

   g. **Press** F2 ('Mod') to modify. ☐

   h. **Use** Scroll Keys to select 'LAN Control'. ☐

   i. **Press** “PROG” Key. ☐

   j. **Press** F1 until Main Screen appears. ☐

   k. **Press** F2 (‘MCC’) on 1A SAC. ☐

NOTE

1A SAC PRI REG will take CONT of 1B SAC. ☐

   l. **Press** “Reset” Key on MCC Screen of 1A SAC PRI REG to allow SEQ to re-establish communications with 1B SAC. ☐

   m. **Notify** CONT RM 1B SAC re-integrated to SEQ. ☐

4.9.3 Re-Integrating 1C SAC to SEQ

1. **Re-integrate** 1C SAC to SEQ (1A SAC PRI REG) by **performing** the following:

   a. **Obtain** SS permission prior to re-integrating 1C SAC to SEQ. ☐

   b. **Notify** CRO 1C SAC to be re-integrated to SEQ. ☐

   c. **Verify** 1C SAC Automatic Operation LED LIT. ☐

   d. **Press** F1 until Main Screen appears. ☐

   e. **Press and hold** Scroll Up Key to activate “Configurations Menu”. ☐

   f. **Scroll** to option 'C.C.M’. ☐

   g. **Press** F2 ('Mod') to modify. ☐

   h. **Use** Scroll Keys to select 'LAN Control'. ☐

   i. **Press** “PROG” Key. ☐

   j. **Press** F1 until Main Screen appears. ☐

   k. **Press** F2 (‘MCC’) on 1A SAC. ☐

NOTE

1A SAC PRI REG will take CONT of 1C SAC. ☐

   l. **Press** “Reset” Key on MCC Screen of 1A SAC PRI REG to allow SEQ to re-establish communications with 1C SAC. ☐

   m. **Notify** CONT RM 1C SAC re-integrated to SEQ. ☐

4.10 MANUAL BLOWDOWN OF TURBINE BLDG SAC AIR RECEIVERS

4.10.1 Manual BLDN of 1A SAC Air RCVR

1. **Perform** the following for manual BLDN of 1A Air RCVR:

   a. **Open** RCVR Strainer Drain VLV N1P19V867A AND/OR RCVR AUTO Drain BYP VLV N1P19V509A. ☐

   b. **Perform** the following only IF DP needs establishing across CK VLV:

      (1) **Close (**temporarily if needed) Air RCVR Outlet VLV N1P19V501A while blowing down RCVR. ☐

      (2) **Open** Air RCVR Outlet VLV N1P19V501A when DP established across CK VLV. ☐

   c. WHEN draining complete, **perform** the following:

      - **Close** RCVR Strainer Drain VLV N1P19V867A, IF opened. ☐
      - **Close** RCVR AUTO Drain BYP VLV N1P19V509A, IF opened. ☐

4.10.2 Manual BLDN of 1B SAC Air Receivers

1. **Perform** the following for manual BLDN of 1B1 Air RCVR:

   a. **Open** RCVR Strainer Drain VLV N1P19V867B1 AND/OR RCVR AUTO Drain BYP VLV N1P19V509B1. ☐

   b. **Perform** following only IF DP needs establishing across CK VLV:

      (1) **Close (**temporarily if needed) Air RCVR Outlet VLV N1P19V501B1 while blowing down RCVR. ☐

      (2) **Open** Air RCVR Outlet VLV N1P19V501B1 when DP established across CK VLV. ☐

   c. WHEN draining complete, **perform** the following:

      - **Close** RCVR Strainer Drain VLV N1P19V867B1, IF opened. ☐
      - **Close** RCVR AUTO Drain BYP VLV N1P19V509B1, IF opened. ☐

4.10.2 Manual BLDN of 1B SAC Air Receivers (continued)

2. **Perform** the following for manual BLDN of 1B2 Air RCVR:

   a. **Open** RCVR Strainer Drain VLV N1P19V867B2 AND/OR RCVR AUTO Drain BYP VLV N1P19V509B2. ☐

   b. **Perform** the following only IF DP needs establishing across CK VLV:

      (1) **Close** (temporarily if needed) Air RCVR Outlet VLV N1P19V501B2 while blowing down RCVR. ☐

      (2) **Open** Air RCVR Outlet VLV N1P19V501B2 when DP established across CK VLV. ☐

   c. WHEN draining complete, **perform** the following:

      - **Close** RCVR Strainer Drain VLV N1P19V867B2, IF opened. ☐
      - **Close** RCVR AUTO Drain BYP VLV N1P19V509B2, IF opened. ☐

4.10.3 Manual BLDN of 1C SAC Air RCVR

1. **Perform** the following for manual BLDN of 1C Air RCVR:

   a. **Open** RCVR Strainer Drain VLV N1P19V867C AND/OR RCVR AUTO Drain BYP VLV N1P19V509C. ☐

   b. **Perform** following only IF DP needs establishing across CK VLV:

      (1) **Close (**temporarily if needed) Air RCVR Outlet VLV N1P19V501C while blowing down RCVR. ☐

      (2) **Open** Air RCVR Outlet VLV N1P19V501C when DP established across CK VLV. ☐

   c. WHEN draining complete, **perform** the following:

      - **Close** RCVR Strainer Drain VLV N1P19V867C, IF opened. ☐
      - **Close** RCVR AUTO Drain BYP VLV N1P19V509C, IF opened. ☐

4.11 SUPPLYING SW FROM UNIT 2

1. **Open** SW Supply to Air COMPR HDR XCONN U2 To U1 N2P16V783. ☐
2. **Close** SW Emergency Supply HDR ISO N1P16V932. ☐
3. **Close** SW Inlet ISO to SACs N1P16V108. ☐
4. **Verify** proper SAC operation. ☐

4.12 RETURNING SW SUPPLY FROM UNIT 2 TO UNIT 1

1. **Open** SW Inlet ISO to SACs N1P16V108. ☐
2. **Open** SW Emergency Supply HDR ISO N1P16V932. ☐
3. **Close** SW Supply to Air COMPR HDR XCONN U2 To U1 N2P16V783. ☐
4. **Verify** proper SAC operation. ☐

4.13 BYPASSING SAC SW SUPPLY SOLENOID VALVES

4.13.1 Bypassing 1A SAC SW Supply Solenoid VLV N1P19G0507A

1. BYP 1A SAC SW SUPP Solenoid VLV N1P19G0507A by performing the following:
   a. **Open** 1A SAC SW Supply Solenoid BYP VLV N1P16V635A. ☐
   b. **Close** 1A SAC SW Supply Solenoid Inlet Isolation VLV N1P16V627A. ☐
   c. **Close** 1A SAC SW Supply Solenoid Outlet Isolation VLV N1P16V639A. ☐

4.13.2 Bypassing 1B SAC SW Supply Solenoid VLV N1P19G0507B

1. BYP 1B SAC SW SUPP Solenoid VLV N1P19G0507B by performing the following:
   a. **Open** 1B SAC SW Supply Solenoid BYP VLV N1P16V635B. ☐
   b. **Close** 1B SAC SW Supply Solenoid Inlet Isolation VLV N1P16V627B. ☐
   c. **Close** 1B SAC SW Supply Solenoid Outlet Isolation VLV N1P16V639B. ☐

4.13.3 Bypassing 1C SAC SW Supply Solenoid VLV N1P19G0507C

1. BYP 1C SAC SW SUPP Solenoid VLV N1P19G0507C by performing the following:
   a. **Open** 1C SAC SW Supply Solenoid BYP VLV N1P16V635C. ☐
   b. **Close** 1C SAC SW Supply Solenoid Inlet Isolation VLV N1P16V627C. ☐
   c. **Close** 1C SAC SW Supply Solenoid Outlet Isolation VLV N1P16V639C. ☐

4.14 RETURN TO SERVICE: SAC SW SUPPLY SOLENOID VALVES

4.14.1 RTS 1A SAC SW Supply Solenoid VLV N1P19G0507A

1. RTS 1A SAC SW SUPP Solenoid VLV N1P19G0507A by performing the following:
   a. **Open** 1A SAC SW Supply Solenoid Outlet Isolation VLV N1P16V639A. ☐
   b. **Open** 1A SAC SW Supply Solenoid Inlet Isolation VLV N1P16V627A. ☐
   c. **Close** 1A SAC SW Supply Solenoid BYP VLV N1P16V635A. ☐

4.14.2 RTS 1B SAC SW Supply Solenoid VLV N1P19G0507B

1. RTS 1B SAC SW SUPP Solenoid VLV N1P19G0507B by performing the following:
   a. **Open** 1B SAC SW Supply Solenoid Outlet Isolation VLV N1P16V639B. ☐
   b. **Open** 1B SAC SW Supply Solenoid Inlet Isolation VLV N1P16V627B. ☐
   c. **Close** 1B SAC SW Supply Solenoid BYP VLV N1P16V635B. ☐

4.14.3 RTS 1C SAC SW Supply Solenoid VLV N1P19G0507C

1. RTS 1C SAC SW SUPP Solenoid VLV N1P19G0507C by performing the following:
   a. **Open** 1C SAC SW Supply Solenoid Outlet Isolation VLV N1P16V639C. ☐
   b. **Open** 1C SAC SW Supply Solenoid Inlet Isolation VLV N1P16V627C. ☐
   c. **Close** 1C SAC SW Supply Solenoid BYP VLV N1P16V635C. ☐

4.15 PURGE FLOW SETUP FOR TURB BLDG IA DRYER DEWPOINT MONITOR

1. **Open** IA To Dewpoint Sensor ME-569 ROOT N1P19V564. ☐
2. **Open** IA To Dewpoint Sensor ISO N1P19V1076. ☐
3. **Adjust** Flow IND/CONT FOR Dewpoint Sensor ME-569 N1P19FIC0569 to obtain 4-7 SCFH. ($\geq$ 5 SCFH recommended flow). ☐

4.16 RESETTING SAC SERVICE PLAN WARNING ALARMS

NOTE

- If service message shown, inform SSS, record message in CR, reset service message. ☐
- When service plan interval reached, a message will appear on the screen. After MAINT carries out service actions related to the indicated levels, MAINT resets timers associated with Service Plan. [U418371] ☐

4.16.1 Resetting 1A SAC Service Plan Warning Alarms

1. On 1A SAC CONT PNL, perform the following:

   a. **Press** F1 until Main Screen appears. ☐

   b. **Press** F1 to bring up Main Menu Screen. ☐

NOTE

"Service will be blinking in "Status Data Menu". ☐

   c. **Press** Scroll Down Key until "Status Data" followed by horizontal arrow. [Tabulator Key] ☐

   d. **Press** Tabulator Key to activate Menu. ☐

   e. **Press** Scroll Down Key until "Service" followed by horizontal arrow. ☐

   f. **Press** Tabulator Key to activate Menu. ☐

   g. **Scroll** to blinking option. ☐

   h. **Press** Tabulator Key to activate. ☐

   i. **Press** "Reset" Key. ☐

   j. **Press** "Yes" Key. ☐

   k. **Verify** "Service Message" clears. ☐

   l. **Press** F1 until Main Screen appears. ☐

NOTE

- If service message shown, inform SSS, record message in CR, reset service message. ☐
- When service plan interval reached, a message will appear on the screen. After MAINT carries out service actions related to the indicated levels, MAINT resets timers associated with Service Plan. [U418371] ☐

4.16.2 Resetting 1B SAC Service Plan Warning Alarms

1. On 1B SAC CONT PNL, perform the following:

   a. **Press** F1 until Main Screen appears. ☐

   b. **Press** F1 to bring up Main Menu Screen. ☐

NOTE

"Service will be blinking in "Status Data Menu". ☐

   c. **Press** Scroll Down Key until "Status Data" followed by horizontal arrow. [Tabulator Key] ☐

   d. **Press** Tabulator Key to activate Menu. ☐

   e. **Press** Scroll Down Key until "Service" followed by horizontal arrow. ☐

   f. **Press** Tabulator Key to activate Menu. ☐

   g. **Scroll** to blinking option. ☐

   h. **Press** Tabulator Key to activate. ☐

   i. **Press** "Reset" Key. ☐

   j. **Press** "Yes" Key. ☐

   k. **Verify** "Service Message" clears. ☐

   l. **Press** F1 until Main Screen appears. ☐

NOTE

- If service message shown, inform SSS, record message in CR, reset service message. ☐
- When service plan interval reached, a message will appear on the screen. After MAINT carries out service actions related to the indicated levels, MAINT resets timers associated with Service Plan. [U418371] ☐

4.16.3 Resetting 1C SAC Service Plan Warning Alarms

1. On 1C SAC CONT PNL, perform the following:

   a. **Press** F1 until Main Screen appears. ☐

   b. **Press** F1 to bring up Main Menu Screen. ☐

NOTE

"Service will be blinking in "Status Data Menu". ☐

   c. **Press** Scroll Down Key until "Status Data" followed by horizontal arrow. [Tabulator Key] ☐

   d. **Press** Tabulator Key to activate Menu. ☐

   e. **Press** Scroll Down Key until "Service" followed by horizontal arrow. ☐

   f. **Press** Tabulator Key to activate Menu. ☐

   g. **Scroll** to blinking option. ☐

   h. **Press** Tabulator Key to activate. ☐

   i. **Press** "Reset" Key. ☐

   j. **Press** "Yes" Key. ☐

   k. **Verify** "Service Message" clears. ☐

   l. **Press** F1 until Main Screen appears. ☐

5.0 REFERENCES

1. P&IDs, Elementary
   a. A-170059 - (sh. 5, 6, 171-174 & 179), Controlled Air Diagrams
   b. D-170061 - Air to ES & MSR DRN SYS' Check VLVs (PCCVs)
   c. D-170119 - (sh. 5), SW in TURB BLDG (SUPP to A/C's)
   d. D-170131 - Compressed Air SYS
   e. D-170133 - SA SYS
   f. D-170473 - (sh. 1); Essential IA to CONT VLVs (IA in TURB BLDG)
   g. D-170473 - (sh. 2 - 4); Essential CONT Air (IA in TURB BLDG)
   h. D-170473 - (sh. 5); CONT Air SYS (IA outside TURB BLDG)
   i. D-170950 - SW DISCH from Unit 1 & 2 A/C's to plant yard DRN
   j. D-172746 - Station Service Air Compressors
   k. D-175034 - (sh. 1-3), IA SYS (AUX BLDG)
   l. D-175035 - (sh. 1), SA SYS (AUX BLDG, CTMT)
2. Manuals
   a. FSAR - Chapter 9, Section 3.1
   b. FSD - A-181012, IA SYS
   c. U-418371, SAC Instruction Book 1/2P19C0001A,B(C Unit 1)
   d. U-418762, Air Dryer - Installation Operation Maintenance Manual
   e. U-423686, SAC Motor Tech Manual
   f. U-423687, Hankison Automatic Condensate Drain Trap Instruction Manual

5.0 REFERENCES (continued)

3. Design Changes

   a. PCN 841-2989

   b. PCN S78-1-273

   c. PCN S84-1-2914

   d. PCN S89-1-5950

   e. DCP B88-1-4773

   f. DCP S91-2-7267, SAC replacement

   g. DCP S95-1-8887

   h. DCP S00-1-9570, Atlas Copco SAC Modifications to Eliminate Nuisance Alarms/Trips

6.0 RECORDS

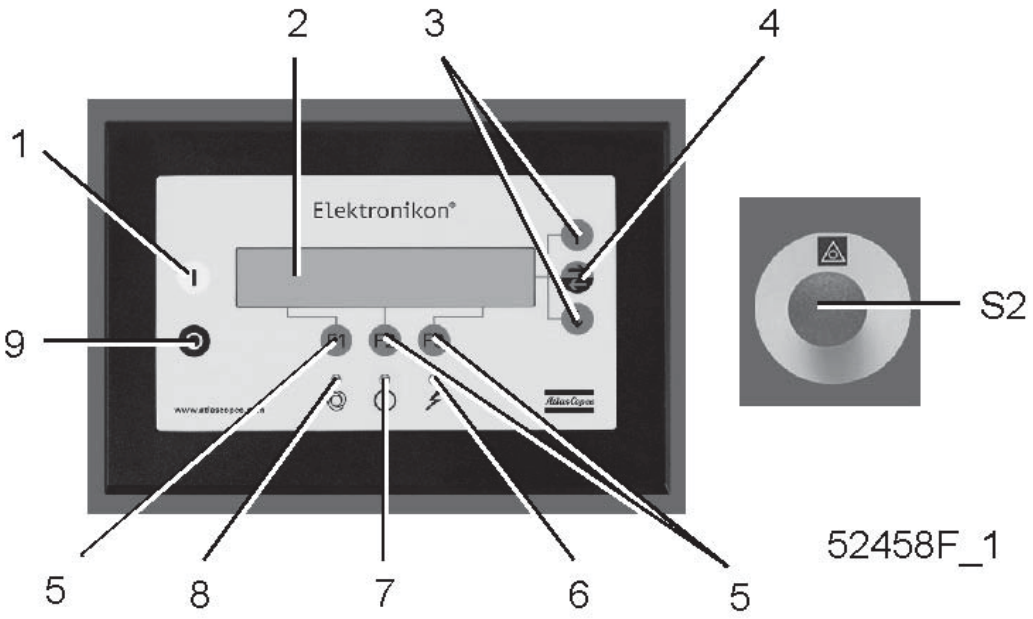
NOTE

Performance of this procedure shall be captured in eSOMS narrative logs. NO documents created by this procedure required for retention, unless otherwise stated or determined for business needs (ex: Human Performance Review Board (HURB), flawed release, or other equipment malfunctions). ☐

QA Record (X)	Non-QA Record (X)	Record Generated	Retention Time	R-Type
NA	X	NA	NA	H06.051

FIGURE 1
Page 1 of 1

MK-IV REG CONT PNL



Reference	Designation	Function
1	Start Button	Button to start SAC. LED (# 8) lights up indicating Elektronikon regulator operative.
2	Display	Shows messages about SAC operating condition, service need, or fault.
3	Scroll Keys	Keys to Scroll upwards or downwards through display.
4	Tabulator Key	Key to select parameter indicated by horizontal arrow. Only parameters followed by an arrow pointing to right can be modified.
5	Function Keys	Keys to control, program SAC.
6	Voltage on LED	Indicates voltage switched on.
7	General Alarm LED	Lit if S/D warning condition exists.
7	General Alarm LED	Flashes if S/D condition exists, if important sensor out of order, or after emergency stop.
8	Automatic Operation LED	Indicates REG automatically controlling SAC.
9	Stop Button	Button to stop SAC. LED (# 8) goes out.
S2	Emergency Stop Button	Push button to stop SAC immediately in event of emergency. After remedying trouble, unlock button by turning to left.

FIGURE 2
Page 1 of 1

MK-IV REG FUNCTIONS

1. Manually load/unload SAC.
2. Call up or go to program settings.
3. Reset a motor overload, S/D or SERV message or EMERG stop.
4. Access data collected by REG.
5. Functions of Keys vary depending on display Menu. Actual function indicated just above relevant Key. Most common functions listed below:

DESIGNATION	FUNCTION
"Add"	To add SAC start/stop commands (day/hour).
"Back"	To return to previously shown option or Menu.
"Cancel"	To cancel programmed setting when programming parameters.
"Delete"	To delete SAC start/stop commands.
"Help"	To find Atlas Copco internet address.
"Limits"	To show limits for programmable setting.
"Load"	To load SAC manually.
"Main screen"	To return from a Menu to Main Screen.
"Menu"	Starting from Main Screen, to have access to submenus.
"Menu"	Starting from submenu, to return to previous Menu.
"Modify"	To modify programmable settings.
"Program"	To program modified settings.
"Reset"	To reset timer or message.
"Return"	To return to previously shown option or Menu.
"Unload"	To unload SAC manually.
"Extra"	To find module configuration of REG.

FIGURE 3
Page 1 of 1

MK-IV REG CONT PROGRAMS

MAIN MENU

PROGRAM	FUNCTION
Main Screen	Shows in short, operation status of SAC. Gateway to all functions. Automatically shown when voltage switched on.
"Status Data"	Calls up status of SAC protection functions (S/D, S/D warning, service warning, warning). Resets S/D, motor overload, service condition.
"Measured Data"	Calls up data currently measured, status of number of inputs.
"Counters"	Calls up run hours, REG (module) hours, number of motor starts.
"Test"	Display test.
"Modify Parameters"	Modifies settings for: parameters (e.g. loading, unloading pressures), protections (e.g. temperature S/D level), service plans (timers for service plans), clock functions (automatic SAC start/stop/pressure band commands), configuration (time, date, display, language).
"Service"	Calls up service plans, resets timers after carrying out service actions belonging to plan.
"Saved Data"	Calls up saved data: last S/D, last emergency stop.

See U-418371, SAC Instruction Book page 52 for flow chart.

FIGURE 4
Page 1 of 1

MK-IV PRI REG: SAC STATUS

1. When switching on voltage (or if no Key pressed during 4 minutes), Main Screen will be shown on 1A SAC PRI REG. ☐
2. **Press** F2 to show MCC Screen. ☐
3. If one of SACs not reacting on command from PRI REG, “Reset” will be shown on MCC Screen. ☐
4. **“Reset”** used to reset communication between PRI REG, other two Secondary Regulators. ☐

■ ■	Related SAC runs loaded.
■	Related SAC runs unloaded.
—	Related SAC stopped.
✶ ✶	Related SAC S/D.
! !	Related SAC not reacting on command from PRI REG.
? ?	No communication between PRI REG, related Secondary REG.
X X	Related SAC not recognized.

FIGURE 5
Page 1 of 1

MK-IV REG: CALLING UP MENUS

1. Main Screen shown automatically when voltage switched on. ☐
2. **Press** F1 (“Menu”) to show Sub-Menus. ☐
3. **Using** up or down Scroll Keys, **Scroll** until desired Sub-Menu (Status Data, Measured Data, Counters, Test, Modify Parameters , Service or Saved Data) followed by horizontal arrow (Tabulator). ☐
4. **Press** Tabulator Key to select desired Sub-Menu. ☐
5. **Scroll Down Key** used for quick look at SAC status. ☐
6. **Scroll** to any option shown in Sub-Menu selected to view contents, **press** Tabulator Key. ☐
7. **Press** appropriate Function Key (F2 or F3) if changes to be made. ☐
8. **Press** F1 when finished to return to Main Screen or Main Menu. ☐
9. **Press** Scroll Up Key for 3 seconds to go directly to “Configuration Menu” if desired. ☐
10. IF function or arrow Keys not used for around 3 minutes, REG will automatically return to Main Screen. ☐

FIGURE 6
Page 1 of 1

MK-IV REG: STATUS DATA MENU

1. Starting from Main Screen. ☐
2. **Press** F1 (“Menu”): option “Status Data” followed by horizontal arrow (Tabulator). ☐
3. **Press** Tabulator Key. ☐
4. IF no abnormal message exists, General Alarm LED not lit; message on display will indicate “all conditions normal”. ☐
5. IF S/D message exists (in case SAC S/D), General Alarm LED will blink. Indicators (***) blinking. Screen shows actual reading, S/D setting. Remains possible to **Scroll** through other menus, to check values of other parameters. When returning to "Status Data" Menu, option "Shutdowns" will blink. This option selected by **pressing** Tabulator Key to return to selected S/D screen. ☐
6. For S/D reset: **Switch off** SAC voltage (open BKR with LCC LCP switch), remedy trouble. After remedying, when S/D condition has disappeared, **switch on** voltage, **press** "Reset" (F3) Key. **Press** "Menu", "Main Screen" Keys to return to Main Screen, restart SAC by **pressing** start button if in Local or MCB H/S if in Remote CONT. If in LAN CONT, **press** Reset Key on 1A SAC REG. ☐
7. For S/D warning message: S/D warning level, programmable level below S/D level. IF S/D warning exists, General Alarm LED lit. Main Screen will change into screen showing “Shutdown Warning” (F2). **Press** "Menu" (F1) Key, Tabulator Key to select "Status Data" Menu. Option "Protection" blinking. **Scroll** to this option, select it by **pressing** Tabulator Key. Screen indicates parameter exceeds programmed S/D warning level. Warning message will disappear automatically as warning condition disappears. IF necessary, **place** SAC in Local, **stop** it by means of stop button, wait until it has stopped. **Switch off** voltage (open BKR with LCC LCP switch), inspect, remedy. After remediation completed, **switch on** voltage, if needed, **press** "Menu", "Main Screen" Keys to return to Main Screen. Restart SAC by **pressing** start button or **place** SAC in LAN CONT, **Press** Reset Key on 1A SAC REG. ☐
8. If service message shown, record service message in CR, then reset service message. ☐

FIGURE 7
Page 1 of 1

MK-IV REG: MEASURE DATA, PROG CONT MODES, SAVED DATA MENUS

MK-IV REG: MEASURE DATA MENU

1. **Press** F1 ('Menu') starting from Main Screen. ☐
2. **Press** Scroll Down Key until "Measured Data" followed by horizontal arrow (Tabulator). ☐
3. **Press** Tabulator Key to activate Menu. ☐
4. By **pressing** Scroll Keys, a number of actually measured data can be found. ☐
5. IF one of sensors linked to S/D, service or warning function, THEN both actually measured value as well as corresponding S/D, warning or service level can be called up by **pressing** Tabulator Key. ☐
6. **Press** F1 to return to Main Menu or Main Screen. ☐

MK-IV REG: PROGRAMMING SAC CONT MODES

1. **Press** F1 (“Menu”) starting from Main Screen. ☐
2. **Press** Scroll Down Key until "Modify Parameters" followed by arrow pointing to right (Tabulator). ☐
3. **Press** Tabulator Key to activate Menu. ☐
4. **Scroll** until "Configuration" followed by horizontal arrow. ☐
5. **Press** Tabulator Key to activate Menu. ☐
6. **Scroll** through display until option "C.C.M." indicated. ☐
7. P**ress** "Mod" Key. ☐
8. “Local Control” blinking, **use** Scroll Keys to select desired control mode. ☐
9. **Press** “Program” Key (F1) to program new control mode or "Cancel" Key (F3) to quit without reprogramming. ☐
10. **Press** F1 to return to Main Menu or Main Screen. ☐

MK-IV REG: SAVED DATA MENU

1. **Press** F1 (“Menu”) starting from Main Screen. ☐
2. **Press** Scroll Down Key until "Saved Data" followed by horizontal arrow.(Tabulator). ☐
3. **Press** Tabulator Key to activate Menu. ☐
4. **Scroll** through items, **press** Tabulator Key on item chosen to find out data reflecting status of SAC. ☐
5. **Scroll**, If desired, through other items. ☐
6. **Press** F1 to return to Main Menu or Main Screen. ☐

ATTACHMENT 1
Page 1 of 4

ALIGNING ALTERNATE AIR SUPPLY TO CTMT (Retain for QA Record)

Completed by:

Signature	Print Name	Initials	Date

Reviewed by:

Signature	Print Name	Initials	Date

ALIGNING ALTERNATE AIR SUPPLY TO CTMT (Retain for QA Record)

1.0 PURPOSE

Provide instructions for aligning BKUP IA to PORVs, to Supply IA to CTMT Purge Dampers, Breathing Air Isolation & Containment Sump Discharge VLVs in Mode 5 or 6. ☐

2.0 INITIAL CONDITIONS

- Version of procedure verified current. ☐
- Procedure verified correct unit for task. ☐
- Administrative LCO for Mode 4 written for completion of Attachment. ☐

3.0 PRECAUTIONS, LIMITATIONS

1. Valves manipulated during course of Attachment will be included on applicable Operations tag out or approved checklist. This will ensure proper valve positioning when test completed. ☐
2. Notify HP if conditions warrant it. ☐
3. Exercise caution if climbing. ☐
4. Exercise caution when venting pressure off air hose when disconnecting. ☐
5. Ensure air hose secured to connections before opening valves. ☐

ALIGNING ALTERNATE AIR SUPPLY TO CTMT (Retain for QA Record)

4.0 INSTRUCTIONS

4.1 ALIGNING ALTERNATE AIR SUPPLY TO CTMT

1. **Route** hose, **connect** with tee from IA to PORVs HDR Test Connection, N1P19V130 (121' CTMT PENE 97B), **connect** to IA Drain, N1P19V975B (105' CTMT under 1A ACCUM) & IA Drain, N1P19V975C (105' CTMT NW quadrant). _____ Initial

CAUTION

Notify HP temporary loss of breathing air, CTMT Purge, may occur while air supplies shifted. ☐

2. **Open** BKUP IA to PORV`s HDR Test CONN, N1P19V130, verify no air leaks on hoses, fittings. _____
3. **Open** IA Drain, N1P19V975B. _____
4. **Open** IA DRN, N1P19V975C. _____
5. **Align** BKUP Air to CTMT. [FNP-1-SOP-62.1, BKUP Air or N2 SUPP to PORVs] _____
6. **Close** IA HDR ISO VLV N1P19V011. [129' CTMT near 1A ACCUM] _____
7. **Close** IA HDR ISO N1P19V094. [105' CTMT near sump SUCT behind elevator] _____
8. **Verify** CTMT Purge Dampers HV3196, HV3197 OPEN. _____
9. **Verify** Breathing Air VLV HV2935C OPEN. _____

NOTE

Section 4.2 to be performed when normal IA to CTMT returned to service. ☐

4.2 RESTORING NORMAL IA TO CTMT PURGE DAMPERS, BREATHING AIR, CTMT SUMP DISCH VALVES

1. **Verify** IA To CTMT, Q1P19HV3611 OPEN. [BOP] _____
2. **Verify** IA TO CTMT HDR ISO, N1P19V009 OPEN. [105' CTMT PENE 48] _____
3. **Open** IA HDR Isolation, N1P19V094. _____
4. **Open** IA HDR Isolation, VLV N1P19V011. _____
5. **Close** IA Drain, N1P19V975B. _____
6. **Close** IA Drain VLV N1P19V975C. _____
7. **Verify** CTMT Purge Dampers HV3196, HV3197 OPEN. _____
8. **Close** BKUP IA to PORV Test Connection, N1P19V130. _____

ALIGNING ALTERNATE AIR SUPPLY TO CTMT (Retain for QA Record)

4.2 RESTORING NORMAL IA TO CTMT PURGE DAMPERS, BREATHING AIR, CTMT SUMP DISCH VALVES (continued)

9. **Remove** hoses attached in Step 1 above, **cap** lines. _____

10. **Secure** BKUP Air to CTMT. [FNP-1-SOP-62.1, BKUP Air or N2 SUPP to PORVs] _____

11. Independently **Verify** the following OPEN:

- IA To CTMT, Q1P19HV3611. [BOP] _____
- CTMT Purge Dampers HV3196, HV3197.
- IA TO CTMT HDR ISO, N1P19V009. [105' CTMT PENE 48] _____
- IA HDR Isolation, N1P19V094. _____
- IA HDR Isolation, VLV N1P19V011. _____

12. Independently **Verify** the following valves CLOSED:

- IA Drain VLV N1P19V975B. _____
- IA Drain VLV N1P19V975C. _____
- BKUP IA to PORV Test Connection N1P19V130. _____

2C SAC OPERATION ON UNIT ONE

Completed by:

Signature	Print Name	Initials	Date

Reviewed by:

Signature	Print Name	Initials	Date

2C SAC OPERATION ON UNIT ONE

1.0 PURPOSE

- Placing 2C SAC on service to supply Unit SA, IA. ☐

2.0 INITIAL CONDITIONS

- Version of procedure verified current. ☐
- Procedure verified correct unit for task. ☐

3.0 PRECAUTIONS, LIMITATIONS

2C SAC must be in Local or Remote Control prior to XCONN with Unit 1. ☐

4.0 INSTRUCTIONS

4.1 ALIGNING 2C SAC TO UNIT 1

NOTE

The following step only required if 2C SAC controlled by SEQ. ☐

1. **Isolate** 2C SAC from the sequencer, **place** in Remote by performing FNP-2-SOP-31, Compressed Air SYS, Sect 4.8. _____
2. **Have** Unit 2 CRO verify 2C SAC not running. _____
3. **Have** Unit 2 CRO verify Unit 2 SACs loading properly, maintaining Unit 2 IA PRESS ≈ 90 - 100 PSIG. _____

CAUTION

To prevent jeopardizing Unit 2 operation, DO NOT proceed unless sufficient SACs in service to supply Unit 2 demand without relying on 2C SAC to maintain air PRESS. ☐

4. **Close** 2C SAC to Unit 2 Air HDR Isolation, N2P19V561. _____
5. **Open** Unit 1 to 2 Compressed Air XCONN, N1P19V560. _____
6. **Have** Unit 2 CRO start 2C SAC. _____
7. **Verify** 2C SAC Local PNL Automatic Operation LED LIT. [green] _____
8. **Direct** Unit 1 CRO to monitor Unit 1 Air HDR PRESS while 2C SAC aligned to Unit 1. _____
9. Locally **monitor** 2C SAC operation. _____
10. **Place** Caution Tag on 2C SAC MCB H/S stating 2C SAC aligned to Unit 1. _____

2C SAC OPERATION ON UNIT ONE

4.2 RETURNING 2C SAC TO NORMAL (UNIT 2) OPERATION:

1. **Verify** 1A, 1B or 1C SAC running. _____
2. IF sufficient SACs running, **have** Unit 2 CRO **stop** 2C SAC. _____
3. IF remaining SACs cannot maintain Unit 1 IA PRESS, **have** Unit 2 CRO **start** 2C SAC. _____
4. **Verify** Unit 2 SACs loading properly, maintaining Unit 2 IA PRESS ≈ 90 - 100 PSIG. _____

CAUTION

To prevent jeopardizing Unit 1 operation, DO NOT proceed unless sufficient SACs in service to supply Unit 1 demand without relying on 2C SAC to maintain air PRESS. ☐

5. **Close** Unit 1 to 2 Compressed Air XCONN, N1P19V560. _____
6. **Open** 2C SAC to Unit 2 Air HDR Isolation, N2P19V561. _____
7. **Notify** Unit 2 CRO 2C SAC returned to Unit 2. _____
8. **Re-integrate** 2C SAC to sequencer (if warranted) by performing FNP-2-SOP-31, Compressed Air SYS, Sect 4.9. _____
9. **Remove** caution tag previously placed on 2C SAC MCB H/S. _____

ATTACHMENT 3
Page 1 of 11

INSTRUMENT AIR DRYER OPERATION (Retain for QA Record)

Completed by:

Group	Signature	Print Name	Initials	Date

Reviewed by (OPS):

Signature	Print Name	Initials	Date

INSTRUMENT AIR DRYER OPERATION (Retain for QA Record)

1.0 PURPOSE

- Guidance for placing, removing, bypassing Unit 1 IA Dryers. ☐

2.0 INITIAL CONDITIONS

- Version of procedure verified current. ☐
- Procedure verified correct unit for task. ☐

3.0 PRECAUTIONS, LIMITATIONS

1. Flow through on-service chamber never halted for any warning or alarm condition. ☐
2. IF warning light or alarm light lit on ADC Controller, **write** CR identifying which light lit. ☐
3. Loss of IA at power may result in Turbine or Reactor Trip. ☐

INSTRUMENT AIR DRYER OPERATION (Retain for QA Record)

NOTE

Purge frequency of IA dryers dependent on regeneration demands, not on cyclic timer. ☐

4.0 INSTRUCTIONS

4.1 PLACING 1A AIR DRYER IN SERVICE

1. **Verify** breaker N1R19L504-N-BKR13, Air Dryer 1A Regeneration Controller, N1P19G506A-N OPEN. [120/208V DIST PNL 1J, TURB BLDG 155', West of 1B SGFP] _____

2. **Verify** the following valves CLOSED:

   - N1P19V505A, 1A Air Dryer Inlet ISO. _____
   - N1P19V506A, 1A Air Dryer Outlet ISO. _____
   - N1P19V1080P, 1A IA Dryer Solenoid Air Supply ISO. _____
   - N1P19V1080R, 1A IA Dryer Pilot Gas Filter Bleed ISO. _____
   - N1P19V1080Q, 1A IA Dryer Moisture Indicator ISO. _____

3. **Close** N1P19V1081H, 1A IA Dryer Inlet Filter Drain Bleed ISO. _____

4. **Close** N1P19V1082G, 1A IA Dryer Outlet Filter Drain ISO. _____

5. **Open** N1P19V1081C, 1A IA Dryer Inlet FLTR ISO. _____

6. **Open** N1P19V1082C, 1A IA Dryer Outlet FLTR ISO. _____

7. **Open** N1P19V1080P, 1A IA Dryer Solenoid Air Supply ISO. _____

8. **Slowly open** 1A Air Dryer Inlet ISO, N1P19V505A to supply PRESS. _____

9. **Open** N1P19V1080Q, 1A IA Dryer Moisture Indicator ISO. _____

NOTE

Step 10 easier to perform with two people, one manipulating N1P19V506A, one observing N1P19PI558. ☐

CAUTION

Verify 1A IA Dryer (F001A) Outlet PRESS IND N1P19PI558, does not exceed 15 PSIG drop in PRESS while pressurizing downstream piping. ☐

10. **Slowly open** N1P19V506A, 1A Air Dryer Outlet ISO, while monitoring N1P19PI558 to ensure air dryer outlet PRESS does not exceed 15 PSIG drop in PRESS while pressurizing downstream piping. _____

INSTRUMENT AIR DRYER OPERATION (Retain for QA Record)

4.1 PLACING 1A AIR DRYER IN SERVICE (continued)

NOTE

Step 11 initialed after checking PRESS in Step 12 because 21 → 31 PSIG requirement in Step 12 will only be displayed for ≈ three (3) minutes (during Regeneration Mode) on N1P19FI565, then SYS PRESS will be displayed. ☐

11. **Close** breaker N1R19L504-N-BKR13, Air Dryer 1A Regeneration Controller, N1P19G506A-N. [120/208V DIST PNL 1J, TURB BLDG 155', West of 1B SGFP] _____

NOTES

- Purge PRESS can only be read, adjusted, when off-stream chamber depressurized for regeneration. When off-stream chamber pressurized, Purge PRESS Indicator reads SYS PRESS. (Ref. U418762) ☐
- I&C assistance will be needed for the following step IF adjustments to be made. ☐

12. IF PRESS on N1P19FI565, Purge Flow Indicator for IA Dryer N1P19F001A, not 21 → 31 PSIG during Regeneration Mode, **perform** the following:

    a. **Slowly** rotate Dryer Purge Throttle VLV, N1P19V1088E, until purge PRESS reads 21 - 31 PSIG. Throttle VLV located ≈ 5 inches behind Purge PRESS Indicator, N1P19FI565 between 2 chambers. Requires screwdriver or similar device to make adjustment.

    _____
    I&C Initial

13. **Notify** CONT RM 1A Air Dryer in service. _____

INSTRUMENT AIR DRYER OPERATION (Retain for QA Record)

4.2 REMOVING 1A AIR DRYER FROM SERVICE

NOTES

- Dryer S/D after Step 4, may be left pressurized during periods of non-use if desired; however, leaving air dryer pressurized NOT DESIRED if maintenance or servicing to be performed. ☐
- IF maintenance or servicing to be performed, complete all steps in this section to depressurize air dryer before beginning work. ☐

CAUTION

Verify 1B Air Dryer in service prior to removing 1A Air Dryer from service. ☐

1. **Open** breaker N1R19L504-N-BKR13, Air Dryer 1A Regeneration Controller, N1P19G506A-N. [120/208V DIST PNL 1J, TURB BLDG 155', West of 1B SGFP] _____

CAUTION

Inlet, outlet isolation valves must be closed to prevent moisture overloading of desiccant beds due to continuous flow without regeneration. ☐

2. **Close** N1P19V506A, 1A Air Dryer Outlet ISO. _____
3. **Close** N1P19V505A, 1A Air Dryer Inlet ISO. _____
4. **Close** N1P19V1080Q, 1A IA Dryer Moisture Indicator ISO. _____

NOTES

- Continue with Steps 5 through 10 to depressurize air dryer through Purge Exhaust Muffler. ☐
- IF maintenance or servicing to be performed on air dryer, verify air dryer depressurized. ☐

5. **Close** N1P19V1080P, 1A IA Dryer Solenoid Air Supply ISO. _____
6. **Open** N1P19V1080R, 1A IA Dryer Pilot Gas Filter Bleed ISO. _____
7. **Verify** PRESS indicates zero (0) PSIG on the following indicators after reasonable amount of time:
   - N1P19PI557, 1A IA Dryer, (F001A) Inlet Air PI. _____
   - N1P19PI561, 1A IA Dryer (F001A) Left Chamber PI. _____
   - N1P19PI562, 1A IA Dryer (F001A) Right Chamber PI. _____
   - N1P19PI558, 1A IA Dryer (F001A) Outlet PI. _____

INSTRUMENT AIR DRYER OPERATION (Retain for QA Record)

4.2 REMOVING 1A AIR DRYER FROM SERVICE (continued)

8. IF PRESS on Step 7 listed PIs does NOT indicate zero (0) PSIG after reasonable amount of time, **open** N1P19V1080Q, 1A IA Dryer Moisture Indicator ISO. _____

9. WHEN PRESS indicates zero (0) on PIs listed in Step 7, **perform** the following:

   a. **Close** N1P19V1081C, 1A IA Dryer Inlet FLTR ISO. _____

   b. **Close** N1P19V1082C, 1A IA Dryer Outlet FLTR ISO. _____

   c. **Open** N1P19V1081H, 1A IA Dryer Inlet Filter Drain Bleed ISO. _____

   d. **Open** N1P19V1082G, 1A IA Dryer Outlet Filter Drain ISO. _____

10. WHEN PRESS indicates zero (0) on PIs listed in Step 7, **notify** CONT RM, 1A Air Dryer removed from service, depressurized. _____

INSTRUMENT AIR DRYER OPERATION (Retain for QA Record)

4.3 PLACING 1B AIR DRYER IN SERVICE

1. **Verify** breaker N1R19L504-N-BKR10, Air Dryer 1B Regeneration Controller, N1P19G506B-N OPEN. [120/208V DIST PNL 1J, TURB BLDG 155', West of 1B SGFP] _____

2. **Verify** the following valves CLOSED:

   - N1P19V505B, 1B Air Dryer Inlet ISO. _____
   - N1P19V506B, 1B Air Dryer Outlet ISO. _____
   - N1P19V1083P, 1B IA Dryer Solenoid Air Supply ISO. _____
   - N1P19V1083R, 1B IA Dryer Pilot Gas Filter Bleed ISO. _____
   - N1P19V1083Q, 1B IA Dryer Moisture Indicator ISO. _____

3. **Close** N1P19V1084H, 1B IA Dryer Inlet Filter Drain Bleed ISO. _____

4. **Close** N1P19V1085G, 1B IA Dryer Outlet Filter Drain ISO. _____

5. **Open** N1P19V1084C, 1B IA Dryer Inlet FLTR ISO. _____

6. **Open** N1P19V1085C, 1B IA Dryer Outlet FLTR ISO. _____

7. **Open** N1P19V1083P, 1B IA Dryer Solenoid Air Supply ISO VLV. _____

8. **Slowly open** 1B Air Dryer Inlet ISO N1P19V505B to supply PRESS. _____

9. **Open** N1P19V1083Q, 1B IA Air Dryer Moisture Indicator ISO. _____

NOTE

Step 10 easier to perform with two people, one manipulating N1P19V506B, one observing N1P19PI560. ☐

CAUTION

Ensure 1B Instrument Air Dryer (F001B) Outlet PRESS IND N1P19PI560 does not exceed a 15 PSIG drop in PRESS while pressurizing downstream piping. ☐

10. **Slowly open** N1P19V506B, 1B Air Dryer Outlet ISO, while monitoring N1P19PI560 to ensure Air Dryer outlet PRESS does not exceed 15 PSIG drop in PRESS while pressurizing downstream piping. _____

INSTRUMENT AIR DRYER OPERATION (Retain for QA Record)

4.3 PLACING 1B AIR DRYER IN SERVICE (continued)

NOTE

Step 11 initialed after checking PRESS in Step 12 because 21 → 31 PSIG requirement in Step 12 will only be displayed for ≈ three (3) minutes (during regeneration mode) on N1P19FI566, then SYS PRESS will be displayed. ☐

11. **Close** breaker N1R19L504-N-BKR10, Air Dryer 1B Regeneration Controller, N1P19G506B-N. [120/208V DIST PNL 1J, TURB BLDG 155', West of 1B SGFP] _____

NOTES

- Purge PRESS can only be read, adjusted, when off-stream chamber depressurized for regeneration. When off-stream chamber pressurized, Purge PRESS Indicator reads SYS PRESS. (Ref. U418762) ☐
- I&C assistance will be needed for the following step IF adjustments to be made. ☐

12. IF PRESS on N1P19FI566, Purge Flow Indicator for IB Dryer N1P19F001B, not 21 → 31 PSIG during Regeneration Mode, **perform** the following :

    a. **Slowly** rotate Dryer Purge Throttle VLV N1P19V1089E until purge PRESS reads 21 - 31 PSIG. Throttle VLV located ≈ 5 inches behind Purge PRESS Indicator, N1P19FI566, between 2 chambers. Requires screwdriver or similar device to make adjustment.

    _____
    I&C Initial

13. **Notify** CONT RM 1B Air Dryer in service. _____

INSTRUMENT AIR DRYER OPERATION (Retain for QA Record)

4.4 REMOVING 1B AIR DRYER FROM SERVICE

NOTES

- Dryer S/D after Step 4, may be left pressurized during periods of non-use if desired; however, leaving air dryer pressurized NOT DESIRED if maintenance or servicing to be performed. ☐
- IF maintenance or servicing to be performed, complete all steps in this section to depressurize air dryer before beginning work. ☐

CAUTION

Verify 1A Air Dryer in service prior to removing 1B Air Dryer from service. ☐

1. **Open** breaker N1R19L504-N-BKR10, Air Dryer 1B Regeneration Controller, N1P19G506B-N. [120/208V DIST PNL 1J, TURB BLDG 155', West of 1B SGFP] _____

CAUTION

Inlet, outlet isolation valves must be closed to prevent moisture overloading of desiccant beds due to continuous flow without regeneration. ☐

2. **Close** N1P19V506B, 1B Air Dryer Outlet ISO. _____
3. **Close** N1P19V505B, 1B Air Dryer Inlet ISO. _____
4. **Close** N1P19V1083Q, 1B IA Dryer Moisture Indicator ISO. _____

NOTES

- Continue with Steps 5 through 10 to depressurize air dryer through Purge Exhaust Muffler. ☐
- IF maintenance or servicing to be performed on air dryer, verify air dryer depressurized. ☐

5. **Close** N1P19V1083P, 1B IA Dryer Solenoid Air Supply ISO. _____
6. **Open** N1P19V1083R, 1B IA Dryer Pilot Gas Filter Bleed ISO. _____
7. **Verify** PRESS indicates zero (0) PSIG on the following indicators after reasonable amount of time:
   - N1P19PI559, 1B IA Dryer, (F001B) Inlet Air PI. _____
   - N1P19PI563, 1B IA Dryer (F001B) Left Chamber PI. _____
   - N1P19PI564, 1B IA Dryer (F001B) Right Chamber PI. _____
   - N1P19PI560, 1B IA Dryer (F001B) Outlet PI. _____

INSTRUMENT AIR DRYER OPERATION (Retain for QA Record)

4.4 REMOVING 1B AIR DRYER FROM SERVICE (continued)

8. IF PRESS on Step 7 listed PIs does NOT indicate zero (0) PSIG after reasonable amount of time, **open** N1P19V1083Q, 1B IA Dryer Moisture Indicator ISO. _____

9. WHEN PRESS indicates zero (0) on PIs listed in Step 7, **perform** the following:

   a. **Close** N1P19V1084C, 1B IA Dryer Inlet FLTR ISO. _____

   b. **Close** N1P19V1085C, 1B IA Dryer Outlet FLTR ISO. _____

   c. **Open** N1P19V1084H, 1B IA Dryer Inlet Filter Drain Bleed ISO. _____

   d. **Open** N1P19V1085G, 1B IA Dryer Outlet Filter Drain ISO. _____

10. WHEN PRESS indicates zero (0) on PIs listed in Step 7, **notify** CONT RM, 1B Air Dryer removed from service, depressurized. _____

INSTRUMENT AIR DRYER OPERATION (Retain for QA Record)

4.5 BYPASSING BOTH AIR DRYERS

1. **Unseal, close** N1P19V888, IA ISO to Air Dryer AUTO BYP ISO. _____
2. **Verify** N1P19V902, Air Dryer AUTO BYP OPEN. _____
3. **Close** N1P19V506A, 1A Air Dryer Outlet ISO. _____
4. **Close** N1P19V506B, 1B Air Dryer Outlet ISO. _____
5. **Close** N1P19V505A, 1A Air Dryer Inlet ISO. _____
6. **Close** N1P19V505B, 1B Air Dryer Inlet ISO. _____
7. **Notify** CONT RM Air Dryers bypassed. _____

4.6 REMOVING BOTH AIR DRYERS FROM BYP

1. **Open** N1P19V505B, 1B Air Dryer Inlet ISO. _____
2. **Open** N1P19V505A, 1A Air Dryer Inlet ISO. _____
3. **Open** N1P19V506A, 1A Air Dryer Outlet ISO. _____
4. **Open** N1P19V506B, 1B Air Dryer Outlet ISO. _____
5. **Verify** N1P19V902, Air Dryer AUTO BYP OPEN. _____
6. **Close, seal** N1P19V888, IA ISO to Air Dryer AUTO BYP ISO. _____
7. **Notify** CONT RM Air Dryers removed from BYP. _____

LEAKAGE ASSESSMENT ON IA HEADER IN CTMT (Retain for QA Record)

Completed by:

Signature	Print Name	Initials	Date

Reviewed by:

Signature	Print Name	Initials	Date

LEAKAGE ASSESSMENT ON IA HEADER IN CTMT (Retain for QA Record)

1.0 PURPOSE

- Attachment written to perform leak assessment of IA HDR inside CTMT to determine possible sources of CTMT air in leakage. ☐

2.0 INITIAL CONDITIONS

- Version of procedure verified current. ☐
- Procedure verified correct unit for task. ☐

3.0 PRECAUTIONS, LIMITATIONS

1. "Positioners" (I/Ps) on PRZR Spray valves (Fisher 846 I/Ps) vent air continuously. Blocking small single port underneath in center of cover plate can cause VLV to reposition. ☐
2. Tables 1 through 4 may be performed in any order. ☐

4.0 INSTRUCTIONS

1. **Verify** IA SYS aligned to CTMT with Q1P19HV3611 OPEN. _____
2. **Locate, identify** air leak(s) on IA secondary HDRs utilizing the following tables:
   - Table 1: Components Downstream of N1P19V094, IA To 105 FT ELEV Northeast Area ISO ☐
   - Table 2: Components Downstream of N1P19V010, IA To 105 FT ELEV Northwest Area ISO ☐
   - Table 3: Components Downstream of N1P19V011, IA To 129 FT ELEV ISO ☐
   - Table 4: Components Downstream of N1P19V012, IA To 155 FT ELEV ISO ☐
3. Generate Condition Report(s) as necessary to have air leaks/components repaired or replaced. _____

TABLE 1
Page 1 of 4

COMPONENTS DOWNSTREAM OF N1P19V094, IA TO 105 FT NE AREA ISO

TPNS	Description	Location	Fail POS	REF Drawing	VLV POS*	Deficiencies**	Date/Time
Q1E21HCV936	ACCUM Vent	CTMT, 129’	F.C.	D175038/2			
Q1E21HV8878B	ACCUM Fill Line	CTMT, 131’	F.C.	D175038/2			
Q1E21HV8875B	ACCUM to Vent	CTMT, 134’	F.C.	D175038/2			
N1G21HV3395C	1C CTMT CLR CNDS Drain	CTMT, 134’	F.C.	D175004/1			
N1G21HV3395D	1D CTMT CLR CNDS Drain	CTMT, 134’	F.C.	D175004/1			
N1G21HV3395B	1B CTMT CLR CNDS Drain	CTMT, 134	F.C.	D175004/1			
Q1E21HV8141B	RCP 1B #1 Seal LKOF	CTMT, 130’	F.O.	D175039/1			
N1E21HV8168B	RMW to RCP 1B Seal	CTMT, 130’	F.C.	D175039/1			
Q1E21HV8878C	1C ACCUM Fill Line ISO	CTMT, 129’	F.C.	D175038/2			
Q1P13HV2866D	CTMT Mini Purge Supply DMPR	CTMT, 129’	F.C.	D175010/1			
Q1P13HV3197	CTMT Purge SUPP	CTMT, 129’	F.C.	D175010/1			
N1G21HV3395A	1A CTMT CLR CNDS DRN ISO	CTMT, 129’	F.C.	D175004/1			
Q1E21HV8141C	1C RCP Seal LKOF	CTMT, 129’ By 1C RCP	F.O.	D175039/1			

*Remote indication acceptable method, when available, for determining VLV POS, confirmation at VLV will serve as peer check.
**If VLV in failed position, there may be no air between positioner, diaphragm to determine diaphragm leakage.

UTABLE 1
Page 2 of 4

COMPONENTS DOWNSTREAM OF N1P19V094, IA TO 105 FT NE AREA ISO

TPNS	Description	Location	Fail POS	REF Drawing	VLV POS*	Deficiencies**	Date/Time
N1E21HV8168C	1C RCP Standpipe Fill ISO	CTMT, 155'	F.C.	D175039/1			
Q1B31PCV444C	PRZR Spray VLV	CTMT, 174'	F.C.	D175037/2			
Q1B31PCV444D	PRZR Spray VLV	CTMT, 174'	F.C.	D175037/2			
N1G21HV7144	RCDT RECIRC ISO	CTMT, 105'	F.O.	D175042/1			
Q1E21HV8154	EXC LTDN ISO (Under RF Canal)	CTMT, 106'	F.C.	D175039/1			
Q1E21HV8153	EXC LTDN ISO (Under RF Canal)	CTMT, 106'	F.C.	D175039/1			
Q1B13HV8032	RX Vessel LKOF ISO	CTMT, 105'	F.O.	D175037/1			
Q1E21HV8879C	1C ACCUM INJ Line Test ISO	CTMT, 105' Below 1C ACCUM	F.C.	D175038/2			
Q1E21HV8877C	1C ACCUM Test Line ISO	CTMT, 105' Below 1C ACCUM	F.C.	D175038/2			
Q1E21HV8145	RCS PRZR AUX Spray	CTMT, 106'	F.C.	D175039/1			
Q1E21HV8146	RCS Normal CHG Line	CTMT, 107'	F.C.	D175039/1			
Q1B13HV8047	PRT N2 Supply ISO (Q1B13V0037)	CTMT, 105'	F.C.	D175037/2			

*Remote indication acceptable method, when available, for determining VLV POS, confirmation at VLV will serve as peer check.
**If VLV in failed position, there may be no air between positioner, diaphragm to determine diaphragm leakage.

UTABLE 1
Page 3 of 4

COMPONENTS DOWNSTREAM OF N1P19V094, IA TO 105 FT NE AREA ISO

TPNS	Description	Location	Fail POS	REF Drawing	VLV POS*	Deficiencies**	Date/Time
Q1G21HV3376	CTMT Sump DISCH	CTMT, 105' OMB	F.C.	D175004/1			
N1B13HV8031	PRT DRN to RCDT ISO (N1B13V002)	CTMT, 105' RCDT Area	F.C.	D175037/2			
N1B13HV8030	RMW to PRT ISO (N1B13V005)	CTMT, 105' - IMB	F.C.	D175037/2			
N1G21HV7127	RCDT DISC	CTMT, 107'	F.O.	D175042/1			
N1G21HV7141	RCDT to PRT	CTMT, 107'	F.C.	D175042/1			
Q1E21HV8175A	LTDN Line PENE RM ISO	CTMT, 108' @ PENE 23	F.C.	D175039/1			
Q1E21HV8175B	LTDN Line PENE RM ISO	CTMT, 108' @ PENE 23	F.C.	D175039/1			
Q1G21LCV1003	RCDT LCV	CTMT, 105' By Elevator	F.C.	D175042/1			
Q1E21HV8879B	1B ACCUM INJ Line Test VLV	CTMT, 105' Below 1B ACCUM	F.C.	D175038/2			
Q1E21HV8877B	1B ACCUM Test Line ISO	CTMT, 105' Below 1B ACCUM	F.C.	D175038/2			

*Remote indication acceptable method, when available, for determining VLV POS, confirmation at VLV will serve as peer check.
**If VLV in failed position, there may be no air between positioner, diaphragm to determine diaphragm leakage.

UTABLE 1
Page 4 of 4

COMPONENTS DOWNSTREAM OF N1P19V094, IA TO 105 FT NE AREA ISO

TPNS	Description	Location	Fail POS	REF Drawing	VLV POS*	Deficiencies**	Date/Time
Q1E12HV3999A	RX CAV CLG DMPR	CTMT, 79’	F.C.	D175010/2			
Q1E12HV3999B	RX CAV CLG DMPR	CTMT, 79’	F.C.	D175010/2			
N1G21HV7143	RCDT Pump RECIRC Orifice BYP	CTMT, 105’	F.C.	D175042/1			
N1P18HV2935C	Service Air to CTMT AUTO ISO	Behind Elevator CTMT, 105' 12' In OVHD	F.C.	D175035/1			

*Remote indication acceptable method, when available, for determining VLV POS, confirmation at VLV will serve as peer check.
**If VLV in failed position, there may be no air between positioner, diaphragm to determine diaphragm leakage.

TABLE 2
Page 1 of 1

COMPONENTS DOWNSTREAM OF N1P19V010, IA TO 105 FT NW AREA ISO

TPNS	Description	Location	Fail POS	REF Drawing	VLV POS*	Deficiencies**	Date/Time
Q1P17HV3184	CCW From RCP Thermal Barrier	CTMT, 122'	F.C.	D175002/2			
Q1E21LCV460	LTDN Line ISO	CTMT, 106'	F.C.	D175039/1			
Q1E21LCV459	LTDN Line ISO	CTMT, 106'	F.C.	D175039/1			
Q1E21HV8147	RCS ALT CHG Line	CTMT, 106'	F.O.	D175039/1			
Q1E21HV8879A	1A ACCUM INJ Line Test	CTMT, 105' Below 1A ACCUM	F.C.	D175038/2			
Q1E21HV8877A	1A ACCUM Test Line ISO	CTMT, 105' Below 1A ACCUM	F.C.	D175038/2			

*Remote indication acceptable method, when available, for determining VLV POS, confirmation at VLV will serve as peer check.
**If VLV in failed position, there may be no air between positioner, diaphragm to determine diaphragm leakage.

TABLE 3
Page 1 of 3

COMPONENTS DOWNSTREAM OF N1P19V011, IA TO 129 FT ISO

TPNS	Description	Location	Fail POS	REF Drawing	VLV POS*	Deficiencies**	Date/Time
Q1E21HV8878A	1A ACCUM Fill Line	CTMT, 131' @ 1A ACCUM	F.C.	D-175038/2			
Q1E21HV8875A	1A ACCUM N2 SUPP/Vent ISO	CTMT, 129' 1A ACCUM	F.C.	D-175038/2			
Q1P13HV2867D	CTMT Mini Purge EXH	CTMT, 134'	F.C.	D-175010/1			
Q1P13HV3196	CTMT Purge EXH	CTMT, 130'	F.C.	D-175010/1			
Q1P17HV3443	CCW From EXC LTDN/RCDT HXs	CTMT, 129' PENE 45 & 46	F.C.	D-175002/2			
Q1E21HV8871	ACCUM Test Line to RWST ISO	CTMT, 134'	F.C.	D-175038/2			
Q1G24HV7699A	1C SG BLDN ISO	CTMT, 134'	F.C.	D-175071/1			
Q1G24HV7699B	1C SG BLDN ISO	CTMT, 134'	F.C.	D-175071/1			
Q1G24HV7698A	1B SG BLDN ISO	CTMT, 134'	F.C.	D-175071/1			
Q1G24HV7698B	1B SG BLDN ISO	CTMT, 134'	F.C.	D-175071/1			
Q1G24HV7697A	1A SG BLDN ISO	CTMT, 134'	F.C.	D-175071/1			
Q1G24HV7697B	1A SG BLDN ISO	CTMT, 134'	F.C.	D-175071/1			
Q1E21HV8142	RCP BYP	CTMT, 125'	F.C.	D-175039/1			
Q1P15HV3179C	1A SG BLDN	CTMT, 134'	F.C.	D-175009/2			

*Remote indication acceptable method, when available, for determining VLV POS, confirmation at VLV will serve as peer check.
**If VLV in failed position, there may be no air between positioner, diaphragm to determine diaphragm leakage.

UTABLE 3
Page 2 of 3

COMPONENTS DOWNSTREAM OF N1P19V011, IA TO 129 FT ISO

TPNS	Description	Location	Fail POS	REF Drawing	VLV POS*	Deficiencies**	Date/Time
Q1P15HV3180C	1B SG BLDN	CTMT, 134'	F.C.	D-175009/2			
Q1P15HV3181C	1C SG BLDN	CTMT, 130'	F.C.	D-175009/2			
Q1P15HV3766	ACCUM Tanks	CTMT, 130'	F.C.	D-175009/1			
Q1P15HV3164	1C ACCUM	CTMT, 130'	F.C.	D-175009/1			
Q1P15HV3163	1B ACCUM	CTMT, 130'	F.C.	D-175009/1			
Q1P15HV3162	1A ACCUM	CTMT, 130'	F.C.	D-175009/1			
Q1P15HV3181A	1C SG Lower B/D	CTMT, 130'	F.C.	D-175009/2			
Q1E21HV8143	EXC LTDN Divert VLV	CTMT, 109'	Fails to VCT	D-175039/1			
Q1P15HV3180A	1B SG Lower BLDN	CTMT, 134'	F.C.	D-175009/2			
Q1P15HV3179A	1A SG Lower BLDN	CTMT, 134'	F.C.	D-175009/2			
Q1P15HV3181B	SG 1C Upper BLDN	CTMT, 129'	F.C.	D175071/1			
Q1P15HV3180B	SG 1B Upper BLDN	CTMT, 129'	F.C.	D175071/1			
N1B13HV8031	PRT DRN to RCDT ISO (N1B13V002)	CTMT, 105' RCDT Area	F.C.	D175037/2			
Q1P15HV3179B	SG 1A Upper BLDN	CTMT, 129'	F.C.	D175071/1			

*Remote indication acceptable method, when available, for determining VLV POS, confirmation at VLV will serve as peer check.
**If VLV in failed position, there may be no air between positioner, diaphragm to determine diaphragm leakage.

UTABLE 3
Page 3 of 3

COMPONENTS DOWNSTREAM OF N1P19V011, IA TO 129 FT ISO

TPNS	Description	Location	Fail POS	REF Drawing	VLV POS*	Deficiencies**	Date/Time
Q1E21HV8141A	1A RCP Seal LKOF	CTMT, 129' 1A RCP (OMB)	F.O.	D-175039/1			
Q1E21HV8149A	Orifice Isolation	CTMT, 106'	F.C.	D-175039/1			
Q1E21HV8149B	Orifice Isolation	CTMT, 106'	F.C.	D-175039/1			
Q1E21HV8149C	Orifice Isolation	CTMT, 106'	F.C.	D-175039/1			
Q1E21HCV137	Excess LTDN HX DISCH	CTMT, 106'	F.C.	D-175039/1			
Q1G21HV7126	RCDT DISCH	CTMT, 108'	F.C.	D-175042/1			

*Remote indication acceptable method, when available, for determining VLV POS, confirmation at VLV will serve as peer check.
**If VLV in failed position, there may be no air between positioner, diaphragm to determine diaphragm leakage.

TABLE 4
Page 1 of 1

COMPONENTS DOWNSTREAM OF N1P19V012, IA TO 155 FT ISO

TPNS	Description	Location	Fail POS	REF Drawing	VLV POS*	Deficiencies**	Date/Time
N1E21HV8168A	1A RCP Standpipe Fill ISO	CTMT, 155’	F.C.	D175039/1			

*Remote indication acceptable method, when available, for determining VLV POS, confirmation at VLV will serve as peer check.
**If VLV in failed position, there may be no air between positioner, diaphragm to determine diaphragm leakage.

jpm k.

SO-368A

TITLE: Align RCDT Discharge To WHT

PROGRAM APPLICABLE: SOT __X__ SOCT ____ OLT __X__ LOCT _____

ACCEPTABLE EVALUATION METHOD: ____ PERFORM __X__ SIMULATE ____ DISCUSS

EVALUATION LOCATION: ____ SIMULATOR ____ CONTROL ROOM __X__ PLANT

PROJECTED TIME: __20 MIN__ SIMULATOR IC NUMBER: __N/A__

ALTERNATE PATH ____ TIME CRITICAL ____ PRA _____

JPM DIRECTIONS:

1. All actions will be **SIMULATED.**
2. This JPM may be performed on either unit.
3. Provide student HANDOUT and procedure.
4. Allow student time to review conditions and procedure.
5. Unit 2 numbers are in (parentheses)

TASK STANDARD:

1. Pump the RCDT to the WHT per FNP-1(2)-SOP-50.0, step 4.1.4, to decrease RCDT level to approximately 10%.

Examinee:	
Overall JPM Performance:	**Satisfactory** ☐ **Unsatisfactory** ☐
Evaluator Comments (attach additional sheets if necessary)	

EXAMINER: _____

Developer	S. Jackson	Date: 4/6/15
NRC Approval	SEE NUREG 1021 FORM ES-301-3	

CONDITIONS

When I tell you to begin, you are to ALIGN THE RCDT DISCHARGE TO THE WHT on UNIT1(2) PER SOP-50.0. The conditions under which this task is to be performed are:

a. The RCDT is aligned per SOP-50.0A.
b. #1 RHT is on service per SOP-2.4.
c. The liquid waste system is aligned per SOP-50.0.
d. Both RCDT pumps are off and aligned for normal operation per SOP-50.0.
e. RCDT level / pressure, and WHT level has been checked.
   - RCDT level is 50%,
   - RCDT pressure is 5psig
   - WHT level is 20%.
f. You have been instructed by the control room to pump the RCDT to the WHT per FNP-1(2)-SOP-50.0, step 4.1.4, to decrease RCDT level to approximately 10%.

EVALUATION CHECKLIST

ELEMENTS:		STANDARDS:	RESULTS: (CIRCLE)
_____ START TIME			
*1.	4.1.4.1 **Open** RCDT DISCH TO WHT, Q1(2)G21V009 (1(2)-LWP-V-7137).	Q1(2)G21V009 is turned counter-clockwise. **(CUE: V009 is as you described)**	S / U
*2.	4.1.4.2 **Close** RCDT PUMP DISCH TO RHT ISO, Q1(2)E21V315 (1(2)-CVC-V-8551).	Q1(2)E21V315 is turned clockwise. **(CUE: V315 is as you described.)**	S / U

NOTE FOR CUE IF ASKED:
RCDT ANNUNCIATORS initial conditions:

Window 11 REACTOR COOLANT DRAIN TANK HI-LO LEVEL *NOT LIT* (75%, 5% stpts)
Window 12 REACTOR COOLANT DRAIN TANK HI TEMP *NOT LIT* (170 degrees stpt)
Window 13 REACTOR COOLANT DRAIN TANK HI PRESS *NOT LIT* (8 psig stpt)
Window 37 REACTOR COOLANT DRAIN TK RECIRC LO FLOW *LIT* (85 gpm stpt)

3.	4.1.4.3 **Verify** open the following valves: • RCDT RECIRC ISO N1(2)G21HV7144 (LWPP) • RCDT OUTLET ISO N1(2)G21HV7127 (LWPP)	N1(2)G21HV7144 and N1(2)G21HV7127 position lights checked on LWPP**. (CUE: Red lights are lit for both valves.)**	S / U

EVALUATION CHECKLIST

ELEMENTS:		STANDARDS:	RESULTS: (CIRCLE)
4.	4.1.4.4 IF required to maintain RCDT pressure by addition of hydrogen, THEN **perform** the following: 1. **Verify** pressure controller WASTE PROCESSING SYSTEM HYDROGEN BOTTLE DIS, Q1(2)G21HV7155 (Q1(2)G21V063) set to maintain 5 psi. (155' Plant Grounds) 2. **Open** H2 bottle isolation. 3. **Open** H2 BOTTLE TO RCDT ISO, N1(2)G21V340. 4. **Verify** open H2 SUPP TO RCDT, N1(2)G21V285(2) (at H2 Bottle) with regulator set for approximately 20 psi.	**(TIME COMPRESSION - CUE: This step has been completed by another operator.)**	S / U
5.	4.1.4.5 **Verify** that RCDT LCV Q1(2)G21LCV1003 (Q1(2)G21V064) is in manual and closed (LWPP)	Q1(2)G21LCV1003 M/A station on LWPP checked to ensure in manual and closed. **(CUE: LCV1003 M/A station display indications are as follows:** • **"M" is lit on display** • **the far right bargraph is at minimum** • **A blue dot is lit above the far right bargraph** • **the display above the 3 bargraphs displays "0.0".)**	S / U
*6.	4.1.4.6 **Take** RCDT LCV Q1(2)G21LCV1003 (Q1(2)G21V064) selector switch on MCB to OPEN and then spring **return** to AUTO.	Control Room contacted to take Q1(2)G21LCV1003 switch to OPEN and returned to AUTO. **(CUE: Control Room acknowledges, and LCV1003 switch has been taken to OPEN and has been returned to AUTO.)**	S / U

EVALUATION CHECKLIST

ELEMENTS:		STANDARDS:	RESULTS: (CIRCLE)
*7.	4.1.4.7 **Open** RCDT PUMPS DISCH LINE ISO Q1(2)G21HV7136.	Control Room contacted to take Q1(2)G21HV7136 switch to OPEN and returned to AUTO. **(CUE: Control Room acknowledges instruction, and HV7136 switch has been taken to OPEN and has been returned to AUTO.)**	S / U
*8.	4.1.4.8 **Place** RCDT LCV, Q1(2)G21LCV1003 (Q1(2)G21V064) in MANUAL and **open** 20-50%. (LWPP)	Q1(2)G21LCV1003 M/A station demand raised to 20-50% by pressing up arrow until desired demand is reached. **(CUE:** • **the far right bargraph is at approximately 40%** • **"39.1" is displayed above the 3 bargraphs)**	S / U
*9.	4.1.4.9 **Start** 1(2)A(B) RCDT pump, and **verify** flow through FI 1008 (LWPP).	Either RCDT pump handswitch taken to start. N1(2)G21FI1008 checked to verify flow**. (CUE:** • **RCDT pump red "running" light lit for pump started.** • **N1(2)G21FI1008 indicates ~100 gpm** • **Alarm clears: WINDOW 37 REACTOR COOLANT DRAIN TK RECIRC LO FLOW.**	S / U
10.	Monitor tank transfer.	RCDT level, pressure and flow are monitored. WHT level is monitored. **(CUE:** • **RCDT level is falling.** • **Alarm clears: WINDOW 11** • **RCDT press stable at 5 psig.** • **RCDT flow is stable at ~ 100 gpm.** • **WHT level is rising slightly.**	S / U

EVALUATION CHECKLIST

ELEMENTS:		STANDARDS:	RESULTS: (CIRCLE)
TIME COMPRESSION - CUE: RCDT LEVEL IS 10% AND PRESSURE IS 5 PSIG.			
*11.	4.1.4.10 WHEN desired level is reached, THEN **perform** the following: a. **Stop** 1(2)A(B) RCDT pump.	RCDT pump handswitch is taken to off. **(CUE:** • **Green "stopped" light is lit.** • **Alarm comes in: WINDOW 37 REACTOR COOLANT DRAIN TK RECIRC LO FLOW.**	S / U
	b. **Close** RCDT LCV, Q1(2)G21LCV1003 (Q1(2)G21V064) (LWPP).	Q1(2)G21LCV1003 M/A station demand lowered to 0% by depressing the down arrow. **(CUE: the far right bargraph is at minimum and the display above the bargraphs indicates 0.0)**	S / U
*12.	4.1.4.11 **Realign** valves as follows: • **Open** RCDT PUMP DISCH TO RHT ISO, Q1(2)E21V315 (1(2)-CVC-V-8551).	Q1(2)E21V315 is turned counter-clockwise. **(CUE: V315 is as you described.)**	S / U
	• **Close** RCDT DISCH TO WHT Q1(2)G21V009 (1(2)-LWP-V-7137).	Q1(2)G21V009 is turned clockwise. **(CUE: V009 is as you described)**	S / U
13.	4.1.4.12 Verify RCDT pressure PI 1004 (LWPP) between 3 and 8 psig.	PI 1004 checked. **(CUE: PI 1004 indicates 5 psig)**	S / U
14.	4.1.4.13 IF opened in step 4.1.4.4, THEN **perform** the following: 1. **Close** H2 bottle isolation. 2. **Close** H2 BOTTLE TO RCDT ISO, N1(2)G21V340.	**(CUE: This step will be performed by another operator)**	S / U
15.	4.1.4.14 Restore the RCDT to normal per section 4.1.2.	**(CUE: Another operator will complete this step)**	S / U

____ STOP TIME

EVALUATION CHECKLIST

ELEMENTS:	STANDARDS:	RESULTS: (CIRCLE)
Terminate when Pump Down is complete.		

CRITICAL ELEMENTS: Critical Elements are denoted with an asterisk (*) preceding the element number.

GENERAL REFERENCES:

1. FNP-1(2)-SOP-50.0, Version 75(70)
2. K/As: 068K1.07 - 2.7 / 2.9

GENERAL TOOLS AND EQUIPMENT:

Provide:

1. FNP-1(2)-SOP-50.0, section 4.1.4

Critical ELEMENT justification:

STEP	Evaluation
1, 2,	Critical – Task completion. Proper line up to move water from RCDT to WHT.
3 – 5	Not Critical – NO actions required by operator.
6 - 9	Critical – Task completion. Proper line up to move water from RCDT to WHT.
10	Not Critical – NO actions required.
11-12	Critical – Task completion. Required to not pump the RCDT dry and restore system line up
13-15	Not Critical – NO actions required.

COMMENTS:

jpm k.
CONDITIONS

When I tell you to begin, you are to ALIGN THE RCDT DISCHARGE TO THE WHT PER SOP-50.0. The conditions under which this task is to be performed are:

a. The RCDT is aligned per SOP-50.0A.
b. #1 RHT is on service per SOP-2.4.
c. The liquid waste system is aligned per SOP-50.0.
d. Both RCDT pumps are off and aligned for normal operation per SOP-50.0.
e. RCDT level / pressure, and WHT level has been checked.
   - RCDT level is 50%,
   - RCDT pressure is 5psig
   - WHT level is 20%.
f. You have been instructed by the control room to pump the RCDT to the WHT per FNP-2-SOP-50.0, step 4.1.4, to decrease RCDT level to approximately 10%.

FARLEY NUCLEAR PLANT

SYSTEM OPERATING PROCEDURE

FNP-1-SOP-50.0

SAFETY RELATED

LIQUID WASTE PROCESSING SYSTEM

PROCEDURE LEVEL OF USE CLASSIFICATION PER NMP-AP-003	
CATEGORY	**SECTIONS**
Continuous:	**ALL**
Reference:	**NONE**
Information:	**NONE**

Approved: David L Reed Effective Date: 04/16/2015

Operations

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FARLEY NUCLEAR PLANT
UNIT 1
SYSTEM OPERATING PROCEDURE SOP-50.0

LIQUID WASTE PROCESSING SYSTEM

1.0 PURPOSE

This procedure provides the Initial Conditions, Precautions and Limitations, and Instructions for Operation of the Liquid Waste Processing System. Included are the following instructions.

4.1 Reactor Coolant Drain Tank (RCDT) Operation
- 4.1.1 RCDT system startup and recirculation
- 4.1.2 RCDT normal operation
- 4.1.3 Manual Pump Down of RCDT to RHT
- 4.1.4 RCDT Discharge to WHT
- 4.1.5 Draining refueling canal with the RCDT System to the RWST.
- 4.1.6 Filling the RCDT from the PRT
- 4.1.7 Draining Refueling Cavity Using the RCDT System and Pumping to the RHT or WHT
- 4.1.8 Processing Nozzle Dam Leakage to RHT.
- 4.1.9 Draining the RCS Loops for Maintenance Via the Reactor Coolant Drain System.
- 4.1.10 Establishing a Hydrogen Atmosphere in the RCDT.
- 4.1.11 Establishing a Nitrogen Atmosphere in the RCDT

4.2 Waste Holdup Tank (WHT) Operation

4.3 Waste Evap Condensate Tank (WECT) Operation

4.4 Chemical Drain Tank (CDT) Operation - Draining the CDT to the WHT

4.5 Floor Drain Tank (FDT) System Operation

4.6 #1(2) Waste Monitor Tank (WMT) Operation

4.7 #1(2) Waste Monitor Tank (WMT) Recirculation

4.8 Educting Diaphragm on WECT

4.9 Laundry and Hot Shower Tank (LHST) Operation

4.10 Manually Draining Refueling Cavity to CTMT Sump

4.11 Alternate Processing of the FDT to the WHT

4.12 Draining the Cask Wash area to the FDT

Appendix 1 Measurement of Floor Drain Tank Pump Recirc Line Flow.

Appendix 2 Floor Drain Tank Filter Isolation for Filter Replacement.

Appendix 3 Floor Drain Tank Strainer Isolation for Basket Cleaning or Replacement.

Appendix 4 LHST Strainer Isolation for Basket Cleaning or Replacement.

Appendix 5 Processing FDT Using Temporary Demin Liner

Appendix 6 Use of the RCDT LCV-1003 Controller

Appendix 7 Installation of Temporary Level Indication for the Floor Drain Tank

Appendix 8 Waste Evaporator Feed Filter Isolation for filter replacement

2.0 INITIAL CONDITIONS

2.1 The electrical distribution system is energized and aligned for normal operation per system checklist FNP-1-SOP-36.0, PLANT ELECTRICAL DISTRIBUTION LINE-UP, with exceptions noted.

2.2 The compressed air system is in service and aligned for normal operation per FNP-1-SOP-31.0, COMPRESSED AIR SYSTEM, with exceptions noted.

2.3 The liquid waste processing system valves are aligned per system checklist FNP-1-SOP-50.0A-E, LIQUID WASTE PROCESSING SYSTEM, with exceptions noted.

2.4 Component cooling water system is aligned per FNP-1-SOP-23.0, COMPONENT COOLING WATER SYSTEM, to supply water to the waste evaporator condenser, distillate cooler, vent condenser, and RCDT heat exchanger. This initial condition may be waived by the Shift Supervisor if not required to support the activity being performed.

2.5 A hydrogen blanket has been established in the RCDT and is being maintained at a pressure between three and eight psig per Section 4.1.10. This initial condition may be waived by the Shift Supervisor if not required to support the activity being performed.

2.6 Solid Waste Processing System aligned per FNP-1-SOP-49.0A, SOLID WASTE PROCESSING SYSTEM, and FNP-1-SOP-49.0B, STEAM GENERATOR BLOWDOWN SPENT RESIN STORAGE SYSTEM.

2.7 The WHT to Recycle Evap. Spoolpiece and the R.E.C. Filter to WECT Spoolpiece are both removed and blind flanges are installed.

3.0 PRECAUTIONS AND LIMITATIONS

3.1 Due to the presence of radioactive or potentially radioactive materials within the confines of the liquid waste processing system, constant vigilance must be exercised over system piping, valves, tanks, and other components whether in operation or shutdown. Pre-operational checks and normal routine operations and surveillance should include visual checks for system deterioration, component leakage, and correct system line-up which if not detected and corrected could subsequently result in the release of radioactive liquid to the immediate area, the environment, or other parts of this system.

3.2 Radiation monitor R-18 must be operable and in service during liquid waste discharge to the river except as permitted by technical specifications.

3.3 IF R-18 becomes inoperable while discharging liquid waste to the river, THEN the discharge must be stopped immediately.

3.4 The Shift Supervisor or Shift Support Supervisor shall be notified any time R-18 is taken out of service or becomes inoperable.

3.5 A Radioactive Liquid Release Permit must be completed and approved prior to discharging radioactive liquid to the river.

3.6 Verify that tanks aligned to receive liquid waste discharge have sufficient capacity to receive the liquid.

3.7 ALL tank levels shall be monitored periodically during processing, discharge or transfer of liquid waste, including non-source and non-destination tank levels. For processing or transfers, the levels of the source tank and the destination tank should be determined. The approximate flow rate should be considered and used to determine an approximate completion time. Tank levels shall be checked prior to the estimated completion of the processing or transfer such that sufficient margin exists to prevent tank overflow. At no time should the High Level Alarm be relied upon for securing the processing or transfer of a tank. To preclude overflow, waste tanks should not be filled to greater than 95%.

3.8 A deficiency report should be written to replace liquid waste system filters when the ΔP increases to greater than 20 psid.

3.9 Caution should be exercised when pumping liquids to ascertain that affected pumps do not lose suction.

3.10 Once a WMT has been placed on recirculation for sampling purposes, prior to discharging to the environment, the tank shall remain in an isolated condition to prevent the introduction of any liquids which could alter the concentrations of the tanks contained volume.

3.11 WECT should not be drained less than 5% to prevent admission of air under the diaphragm.

3.12 Sample source tank for activity prior to transfer from Unit 1 to Unit 2. This sample may be waived by Chemistry based on source of water.

3.13 When filling the WMT's, estimate the time that the WMT tank will reach 80% level. The estimated time to reach 80% may be determined by timing the WMT level increase for at least 5% and extrapolating the time to reach 80%. WHEN the WMT reaches 80%, THEN continuously monitor the WMT level indication to ensure the WMT filling is secured prior to exceeding 85%. (IR 2-96-167)

3.14 Contact Health Physics prior to opening N1G21V021 Refueling Cavity Drain. Opening this valve has the potential for increased dose rates in the RCDT pump area and 100' PPR in Aux Building. (AI2008207409)

4.0 INSTRUCTIONS

4.1 REACTOR COOLANT DRAIN TANK (RCDT) OPERATION.

4.1.1 RCDT system startup and recirculation

4.1.1.1 RCDT system is aligned per system checklist FNP-1-SOP-50.0A.

4.1.1.2 RCDT level is greater than 20%.

4.1.1.3 **Verify** open the following valves:

- RCDT RECIRC ISO N1G21HV7144 (LWPP)
- RCDT OUTLET ISO N1G21HV7127 (LWPP)

4.1.1.4 **Verify** that RCDT LCV Q1G21LCV1003 (Q1G21V064) is in MANUAL and closed (LWPP)

4.1.1.5 **Start** an RCDT pump.

NOTE: The following condition should be tracked using a caution tag or administrative tracking item to ensure that it is restored when recirc is no longer required.

4.1.1.6 **IF** necessary to establish adequate recirc flow to keep an RCDT pump running, **THEN** open RCDT RECIRC VALVE N1G21HV7143.

4.1.1.7 IF desired to adjust tank level while on recirc, THEN **adjust** RCDT LCV Q1G21LCV1003 (Q1G21V064) as required in manual or automatic to control RCDT level.

4.1.2 RCDT normal operation

NOTES:

- Venting of the RCDT should be performed as needed in accordance with FNP-1-SOP-51.0, WASTE GAS SYSTEM.
- The RCDT should be pumped down periodically per sections 4.1.3 or 4.1.4 to maintain parameters within the following bands:

	MIN	MAX
RCDT Level	5%	75%
RCDT Pressure	3 PSIG	8 PSIG
RCDT Temp	N/A	170° F

- RCDT pumps should automatically trip at 10% RCDT level.

4.1.2.1 **Place** both RCDT pumps in PULL TO LOCK.

4.1.2.2 **IF** opened in step 4.1.1.6, **THEN** close RCDT RECIRC VALVE N1G21HV7143.

4.1.2.3 **Verify** that RCDT LCV Q1G21LCV1003 (Q1G21V064) is in MANUAL and closed (LWPP)

4.1.2.4 **Take** RCDT LCV Q1G21LCV1003 (Q1G21V064) selector switch on MCB to OPEN and then spring **return** to AUTO.

4.1.2.5 **Take** RCDT PUMPS DISCH LINE ISO Q1G21HV7136 (Q1G21V006) handswitch on MCB, to OPEN and in AUTO.

4.1.2.6 WHEN necessary to lower tank level or pressure, THEN **perform** Section 4.1.3 to pump to the RHT OR 4.1.4 to pump to the WHT.

NOTE:	The following section may be utilized to lower RCDT pressure by lowering RCDT level.

4.1.3 Manual Pump Down of RCDT to RHT:

4.1.3.1 **Verify** open the following valves:

- RCDT RECIRC ISO N1G21HV7144 (LWPP)
- RCDT OUTLET ISO N1G21HV7127 (LWPP)

4.1.3.2 IF required to maintain RCDT pressure by addition of hydrogen, THEN **perform** the following:

a. **Verify** pressure controller H2 SUPP TO RCDT Q1G21HV7155 (Q1G21V063) set to maintain 3 psi. (155' Plant Grounds)

b. **Open** H_2 bottle isolation.

c. **Open** H2 BOTTLE TO RCDT ISO, N1G21V340.

d. **Verify** open H2 SUPP TO RCDT, N1G21V285 (at H_2 Bottle) with the bottle regulator set for approximately 20 psi.

4.1.3.3 **Verify** that RCDT LCV Q1G21LCV1003 (Q1G21V064) is in MANUAL and closed (LWPP)

4.1.3.4 **Take** RCDT LCV Q1G21LCV1003 (Q1G21V064) selector switch on MCB to OPEN and then spring **return** to AUTO.

4.1.3.5 **Take** RCDT PUMPS DISCH LINE ISO Q1G21HV7136 (Q1G21V006) handswitch on MCB, to OPEN and then **place** in AUTO.

4.1.3.6 **Place** RCDT LCV, Q1G21LCV1003 (Q1G21V064) in MANUAL and **open** 20-50%. (LWPP)

4.1.3.7 **Start** 1A(B) RCDT pump, and **verify** flow through FI 1008 (LWPP).

4.1.3.8 WHEN desired level is reached, THEN **perform** the following:

a. **Stop** 1A(B) RCDT pump.

b. **Close** RCDT LCV, Q1G21LCV1003 (Q1G21V064) (LWPP).

4.1.3.9 **Verify** RCDT pressure PI 1004 (LWPP) between 3 and 8 psi.

4.1.3.10 IF opened in Step 4.1.3.2, THEN **perform** the following:

a. **Close** H_2 bottle isolation.

b. **Close** H2 BOTTLE TO RCDT ISO, N1G21V340.

4.1.3.11 **Restore** the RCDT to normal operation per Section 4.1.2.

NOTE:
- The following section may be utilized to lower RCDT pressure by lowering RCDT level.
- IF no RCDT pumps are operable, THEN it is permissible to gravity drain to WHT.

4.1.4 RCDT Discharge to WHT:

4.1.4.1 **Open** RCDT DISCH TO WHT, Q1G21V009 (1-LWP-V-7137).

4.1.4.2 **Close** RCDT PUMP DISCH TO RHT ISO, Q1E21V315 (1-CVC-V-8551).

4.1.4.3 **Verify** open the following valves:

- RCDT RECIRC ISO N1G21HV7144 (LWPP)
- RCDT OUTLET ISO N1G21HV7127 (LWPP)

4.1.4.4 IF required to maintain RCDT pressure by addition of hydrogen, THEN **perform** the following:

a. **Verify** pressure controller H2 SUPP TO RCDT Q1G21HV7155 (Q1G21V063) set to maintain 5 psi. (155' Plant Grounds)

b. **Open** H_2 bottle isolation.

c. **Open** H2 BOTTLE TO RCDT ISO, N1G21V340.

d. **Verify** open H2 SUPP TO RCDT, N1G21V285 (at H_2 Bottle) with regulator set for approximately 20 psi.

4.1.4.5 **Verify** that RCDT LCV Q1G21LCV1003 (Q1G21V064) is in MANUAl and closed (LWPP)

4.1.4.6 **Take** RCDT LCV Q1G21LCV1003 (Q1G21V064) selector switch on MCB to OPEN and then spring **return** to AUTO.

4.1.4.7 **Take** RCDT PUMPS DISCH LINE ISO Q1G21HV7136 (Q1G21V006) handswitch on MCB, to OPEN and then spring **return** to AUTO.

4.1.4.8 **Place** RCDT LCV, Q1G21LCV1003 (Q1G21V064) in MANUAL and **open** 20-50%. (LWPP)

4.1.4.9 **Start** 1A(B) RCDT pump, and **verify** flow through FI 1008 (LWPP).

4.1.4.10 WHEN desired level is reached, THEN **perform** the following:

a. **Stop** 1A(B) RCDT pump.

b. **Close** RCDT LCV, Q1G21LCV1003 (Q1G21V064) (LWPP).

4.1.4.11 **Realign** valves as follows:

- **Open** RCDT PUMP DISCH TO RHT ISO, Q1E21V315 (1-CVC-V-8551).
- **Close** RCDT DISCH TO WHT Q1G21V009(1-LWP-V-7137).

4.1.4.12 **Verify** RCDT pressure PI 1004 (LWPP) between 3 and 8 psi.

4.1.4.13 IF opened in Step 4.1.4.4, THEN **perform** the following:

a. **Close** H_2 bottle isolation.

b. **Close** H2 BOTTLE TO RCDT ISO, N1G21V340.

4.1.4.14 **Restore** the RCDT to normal operation per section 4.1.2.

4.1.5 Draining refueling canal with the RCDT System to the RWST:

4.1.5.1 **Stop** all operating RCDT pumps.

4.1.5.2 **Close** RCDT OUTLET ISO N1G21HV7127 (N1G21V006).

4.1.5.3 **Close** RCDT RECIRC ISO N1G21HV7144 (N1G21V106).

4.1.5.4 **Verify** closed RCDT DISCH TO WHT Q1G21V009 (1-LWP-V-7137).

4.1.5.5 **Verify** closed RCDT PUMP DISCH TO RHT ISO, Q1E21V315 (1-CVC-V-8551).

4.1.5.6 **Verify** closed PRESSURIZER RELIEF TANK DRN N1B13V002 (N1B13HV8031).

4.1.5.7 **Verify** SFP purification loop is not in operation per FNP-1-SOP-54.0, SPENT FUEL PIT COOLING AND PURIFICATION SYSTEM.

4.1.5.8 IF RWST purification is in operation, THEN **perform** the following:

a. **Stop** the RWP pump.

b. **Close** Q1G31HV033A, RWST TO RWPP AUTO ISO (MCB)

c. **Close** Q1G31HV033B, RWST TO RWPP AUTO ISO (MCB)

NOTES:
- IF jumper installed in the following step, a tracking item must be initiated to ensure jumper removed prior to Mode 4 entry.
- Jumper to be installed in the following step is necessary to bypass HV033A/B OPEN / RWPP start interlock if HV033A OR HV033B cannot be operated (no power, FNP-1-SOP-54.0 - Attachment 9 not in use with EG4 ILLUMINATED, etc).
- IF jumper is to be installed in the following step, performer may continue in this procedure while awaiting jumper installation. Jumper installation must be completed prior to performing Step 4.1.5.17

4.1.5.9 IF desired to use RWP pump to assist pumping down cavity at Step 4.1.5.17 AND Q1G31HV033A OR Q1G31HV033B cannot be operated, in N1G31HS2764, **install** jumper between TB1-3 and TB1-4. (Reference D177244/1, SNC540544E006, B181606/100 & 101).

4.1.5.10 **Verify** the following open:

a. RWP PUMP DISCH ISO, N1G31V008 (1-SFP-V-8792)

b. SFP PURIF OUTLET TO RWST, N1G31V021B (1-SFP-V-8793B).

4.1.5.11 **Bypass** the SFP demineralizer by performing the following:

- **Close** SFP PURIF INLET ISO, N1G31V009 (1-SFP-V-8773).
- **Open** SFP DEMIN BYPASS, N1G31V012 (1-SFP-V-8774).
- **Close** SFP DEMIN INLET ISO, N1G31V003 (1-SFP-V-8776).

4.1.5.12 **Verify** RCDT PUMPS DISCH LINE ISO Q1G21HV7136 (Q1G21V006) is open and the handswitch is in the AUTO position.

NOTES:
- The RWP pump is not required; however, experience has shown it greatly increases flow and it is normally desired to have running.
- **Throttle** SFP PURIF OUTLET TO RWST, N1G31V021B (1-SFP-V-8793B) as necessary to limit flow through SFP demineralizer to $\leq$ 100 GPM on FI-654.
- N1G21V021 should not be opened until Rx Cavity draining is in progress (AI2008207409)

4.1.5.13 **Open** REFUELING CANAL DRN, N1G21V021 (1-LWP-V-7129).

4.1.5.14 **Open** RCDT DISCH TO SFPCS RWPP SUCT, Q1G21V008 (1-LWP-V-7138).

4.1.5.15 **Open** RCDT LCV Q1G21LCV1003 (Q1G21V064).

NOTES:
- In the following step, it will be necessary to hold the handswitch in start for the RCDT pump until flow is established to permit the pump to remain running.
- An operator stationed at the refueling water purification pump should monitor discharge pressure of the pump. When RWST pump discharge pressure increases due to the start of the RCDT pump, the RWST purification pump may be started per step 4.1.5.16.

4.1.5.16 **Start** an RCDT pump.

CAUTION: The RWP pump does not have a low flow trip.

4.1.5.17 IF desired, **perform** one of the following to start RWP pump:

a. IF Q1G31HV033A OR Q1G31HV033B cannot be operated, **perform** the following:

(1) **Verify** jumper installed per Step 4.1.5.9.

(2) **Start** RWP pump

OR

b. IF Q1G31HV033A AND Q1G31HV033B can be operated, **perform** the following:

(1) IF MCB annunciator EG4, RWST MIN TECH SPEC LVL A TRN ILLUMINATED, **verify** jumpers installed per FNP-1-SOP-54.0, Attachment 9.

(2) **Verify** Q1G31V010, RWP PUMP SUCTION FROM RWST ISO CLOSED.

(3) **Open** the following:

- Q1G31V033A, RWST TO RWPP AUTO ISOLATION
- Q1G31V033B, RWST TO RWPP AUTO ISOLATION

(4) **Start** RWP pump

CAUTION: RCDT pump discharge piping is protected from over pressurization by a relief valve at penetration 31 outside containment which discharges to the equipment drains. This relief valve can sustain seat leakage at pressures above 150 psig.

NOTE: Two RCDT pumps may be required to prevent the RWP pump from cavitating. IF a second RCDT pump is started THEN monitor RCDT pump discharge pressure to ensure the relief valve is not challenged (<150 psig).

4.1.5.18 IF necessary to prevent RWP pump cavitation THEN **start** the second RCDT pump.

4.1.5.19 WHEN the desired RWST level is reached, **perform** the following

a. IF running, **stop** RWP pump.

(1) **Verify** Q1G31V033A, RWST TO RWPP AUTO ISOLATION CLOSED.

(2) **Verify** Q1G31V033B, RWST TO RWPP AUTO ISOLATION CLOSED.

(3) **Open** Q1G31V010, RWP PUMP SUCTION FROM RWST ISO.

NOTE: Procedure should be continued while awaiting jumper removal.

(4) IF installed per Step 4.1.5.9, in N1G31HS2764, **remove** jumper between TB1-3 and TB1-4**.** (Reference D177244/1, SNC540544E006, B181606/100 & 101)

b. **Shift** RCDT discharge to RHT by performing the following:

(1) **Open** RCDT PUMP DISCH TO RHT ISO, Q1E21V315 (1-CVC-V-8551)

(2) **Close** RCDT DISCH TO SFPCS RWPP SUCT, Q1G21V008 (1-LWP-V-7138)

4.1.5.20 WHEN draining is completed, THEN **stop** the RWP pump if running, and **stop** the RCDT pump. **Realign** valves as follows:

- **Close** REFUELING CANAL DRN, N1G21V021 (1-LWP-V-7129).
- **Verify** closed RCDT DISCH TO SFPCS RWPP SUCT, Q1G21V008 (1-LWP-V-7138).
- **Close** RWP PUMP DISCH ISO, N1G31V008 (1-SFP-V-8792).
- **Close** SFP PURIF OUTLET TO RWST, N1G31V021B (1-SFP-V-8793B).
- **Verify** open RCDT PUMP DISCH TO RHT ISO, Q1E21V315 (1-CVC-V-8551).
- **Open** RCDT OUTLET ISO Q1G21HV7127 (Q1G21V006).
- **Open** RCDT RECIRC ISO Q1G21HV7144 (N1G21V106).
- **Close** RCDT LCV Q1G21LCV1003 (Q1G21V064) and **return** control to MANUAL.

4.1.5.21 **Restore** SFP demineralizer alignment by performing the following:

- **Open** SFP PURIF INLET ISO, N1G31V009 (1-SFP-V-8773).
- **Open** SFP DEMIN INLET ISO, N1G31V003 (1-SFP-V-8776).
- **Close** SFP DEMIN BYPASS, N1G31V012 (1-SFP-V-8774).

4.1.5.22 **Restore** the RCDT to normal operation per Section 4.1.2.

NOTE: Leave vent path in operation for pressure increases due to level increases.

4.1.6 Filling the RCDT from the PRT:

4.1.6.1 **Verify** RCDT aligned in recirculation per Section 4.1.

4.1.6.2 **Verify** sufficient water available in PRT.

4.1.6.3 **Open** PRT DRN ISO, N1B13HV8031 (N1B13V002) [MCB].

NOTE: Closing RCDT outlet iso N1G21HV7127 (N1G21V006) RCDT OUTLET ISO will cause rapid rise in RCDT Level.

4.1.6.4 IF required, THEN **close** RCDT OUTLET ISO, N1G21HV7127 (N1G21V006) [LWPP].

4.1.6.5 WHEN desired level reached in RCDT, THEN **verify** RCDT OUTLET ISO, N1G21HV7127 (N1G21V006) open.

4.1.6.6 **Close** PRT DRN ISO, N1B13HV8031 (N1B13V002) [MCB].

4.1.6.7 IF required, THEN **vent** the RCDT per FNP-1-SOP-51.0, WASTE GAS SYSTEM, Section 4.9 or 4.17.

4.1.6.8 **Restore** alignment of RCDT for normal operation per step 4.1.2 of this procedure.

4.1.7 Draining Refueling Cavity Using the RCDT System and Pumping to the RHT or WHT:

4.1.7.1 **Verify** an RHT in service per FNP-1-SOP-2.4, CVCS BORON RECYCLE SYSTEM.

4.1.7.2 **Stop** all operating RCDT pumps.

4.1.7.3 **Close** RCDT OUTLET ISO, N1G21HV7127 (N1G21V006) on LWPP.

4.1.7.4 **Close** RCDT RECIRC ISO, N1G21HV7144 (N1G21V106) on LWPP.

4.1.7.5 **Verify** RCDT PUMPS DISCH LINE ISO, Q1G21HV7136 is open and handswitch is in the auto position (MCB).

NOTE: N1G21V021 should not be opened until Rx Cavity draining is to commence. (AI2008207409)

4.1.7.6 **Open** REFUELING CANAL DRAIN, N1G21V021 (1-LWP-V-7129).

4.1.7.7 **Verify** closed RCDT DISCH TO SFPCS RWPP SUCT, Q1G21V008 (1-LWP-V-7138).

4.1.7.8 IF discharge of the RCDT to the WHT is desired:

a. **Close** RCDT PUMP DISCH TO RHT ISO, Q1E21V315 (1-CVC-V-8551).

b. **Open** RCDT DISCH TO WHT Q1G21V009 (1-LWP-V-7137).

4.1.7.9 IF discharge of the RCDT to the RHT is desired:

a. **Verify** closed RCDT DISCH TO WHT Q1G21V009 (1-LWP-V-7137).

b. **Verify** open RCDT PUMP DISCH TO RHT ISO, Q1E21V315 (1-CVC-V-8551).

c. **Monitor** RHT level and WHEN necessary, THEN **stop** RCDT pumps and **shift** RHT's per FNP-1-SOP-2.4.

4.1.7.10 **Open** RCDT LCV Q1G21LCV1003 (Q1G21V064).

CAUTIONS:
- Continuous monitoring of refueling cavity level is necessary to prevent cavitation of the RCDT pump(s).
- If a second RCDT pump is started, ensure that the flow rate remains at least 15 gpm higher than the flow obtained from a single pump to ensure miniflow protection is maintained. The flow rate will change as the cavity is lowered so the single pump reference will need to be obtained repeatedly.

4.1.7.11 **Start** a RCDT pump.

4.1.7.12 IF desired to start the second RCDT pump, THEN **perform** the following:

a. **Note** the discharge flow rate with a single pump in operation.

b. **Start** the second RCDT pump and verify that the discharge flow rate increases by at least 15 gpm.

c. **Monitor** discharge flow rate, and **secure** one RCDT pump prior to flow decreasing to within 15 gpm of the single pump flow rate. **Return** to Step 4.1.7.12.a and **repeat** as necessary.

4.1.7.13 WHEN draining is complete, THEN **stop** the RCDT pump.

4.1.7.14 **Close** REFUELING CANAL DRN, N1G21V021 (1-LWP-V-7129).

4.1.7.15 **Close** RCDT LCV Q1G21LCV1003 and **place** in MANUAL.

4.1.7.16 **Open** RCDT OUTLET ISO N1G21HV7127 (N1G21V006) on LWPP.

4.1.7.17 **Open** RCDT RECIRC ISO N1G21HV7144 (N1G21V106) on LWPP.

4.1.7.18 IF the RCDT was aligned to the WHT, THEN **perform** the following:

a. **Close** RCDT DISCH TO WHT Q1G21V009 (1-LWP-V-7137).

b. **Open** RCDT PUMP DISCH TO RHT ISO, Q1E21V315 (1-CVC-V-8551).

4.1.7.19 **Restore** the RCDT to normal operation per Section 4.1.2.

4.1.8 Processing Nozzle Dam Leakage to RHT.

4.1.8.1 **Verify** closed RCDT VENT, Q1G21V192 (1-LWP-V-7163).

4.1.8.2 **Connect** drain hose(s) from the nozzle dam leakage to the RCDT VENT, Q1G21V192 (1-LWP-V-7163).

4.1.8.3 **Stop** 1A and 1B RCDT pumps.

4.1.8.4 **Open** RCDT VENT, Q1G21V192 (1-LWP-V-7163).

4.1.8.5 **Control** RCDT level and discharge to RHT per Step 4.1.2.

4.1.8.6 WHEN nozzle dam leakage processing to RHT is no longer required, THEN **perform** the following:

a. **Stop** 1A and 1B RCDT pumps.

b. **Close** RCDT VENT, Q1G21V192 (1-LWP-V-7163).

c. **Remove** nozzle dam drain hose from RCDT vent.

4.1.9 Draining the RCS Loops for Maintenance Via the Reactor Coolant Drain System.

4.1.9.1 **Verify** core unload is completed.

4.1.9.2 **Verify** both trains of RHR are secured.

4.1.9.3 **Verify** nozzle dam leakage processing is secured per Step 4.1.8.6.

4.1.9.4 IF the SFP purification loop is in service, THEN **remove** from service per FNP-1-SOP-54.0, SPENT FUEL PIT COOLING AND PURIFICATION SYSTEM.

4.1.9.5 IF RWST purification is in operation, THEN **remove** from service per FNP-1-SOP-54.0, SPENT FUEL PIT COOLING AND PURIFICATION SYSTEM.

4.1.9.6 **Open** the SFP PURIF OUTLET THE RWST, N1G31V021B (1-SFP-V-8793B).

4.1.9.7 **Open** the RWP PUMP DISCH ISO, N1G31V008 (1-SFP-V-8792).

4.1.9.8 **Close** the RCDT PUMP DISCH TO RHT ISO, Q1E21V315 (1-CVC-V-8551).

4.1.9.9 **Open** the RCDT DISCH TO SFPCS RWPP SUCT, Q1G21V008 (1-LWP-V-7138).

4.1.9.10 **Close** the RCDT RECIRC ISO 1-LWP-HV-7144 (N1G21V106)

4.1.9.11 **Close** the RCDT OUTLET ISO N1G21HV7127 (N1G21V006).

4.1.9.12 **Open** the desired RCS LOOP TO RCDT PUMP ISO:

- Q1B13V002A, (1-RC-V-8057A) AND
- Q1B13V001A, (1-RC-V-8058A) for Loop 1A
- Q1B13V002B, (1-RC-V-8057B) AND
- Q1B13V001B, (1-RC-V-8058B) for Loop 1B
- Q1B13V002C, (1-RC-V-8057C) AND
- Q1B13V001C, (1-RC-V-8058C) for Loop 1C

4.1.9.13 **Open** the RCDT PUMPS DISCH LINE ISO 1-LWP-HV-7136 (Q1G21V006).

4.1.9.14 **Start** 1A (B) RCDT pump.

4.1.9.15 **Adjust** the RCDT LCV Q1G21LCV1003 (Q1G21V064) in manual to control the draining rate and **maintain** RCDT pump flow to ≤ 100 gpm.

4.1.9.16 IF unable to maintain RCDT discharge flow greater than minimum to maintain pump in operation, THEN **perform** the following:

a. **Open** RCDT OUTLET ISO N1G21HV7127 (N1G21V006)

b. **Open** RCDT RECIRC ISO N1G21HV7144 (N1G21V106)

c. **Place** RCDT LCV Q1G21LCV1003 (Q1G21V064) in automatic and **adjust** to maintain RCDT level as desired.

4.1.9.17 WHEN RWST level reaches 39 feet, THEN **shift** RCDT discharge to RHT by performing the following:

a. **Open** RCDT PUMP DISCH TO RHT ISO, Q1E21V315 (1-CVC-V-8551).

b. **Close** RCDT DISCH TO SFPCS RWPP SUCT, Q1G21V008 (1-LWP-V-7138).

4.1.9.18 WHEN the desired RCS level is reached, THEN **stop** the 1A (1B) RCDT pump.

4.1.9.19 **Close** the RCS loop to RCDT pump isolation valve(s) opened in Step 4.1.9.12.

4.1.9.20 **Verify** closed RCDT DISCH TO SFPCS RWPP SUCT, Q1G21V008 (1-LWP-V-7138).

4.1.9.21 **Verify** open RCDT PUMP DISCH TO RHT ISO, Q1E21V315 (1-CVC-V-8551).

4.1.9.22 **Close** SFP PURIF OUTLET TO RWST, N1G31V021B (1-SFP-V-8793B).

4.1.9.23 **Close** the RWP PUMP DISCH ISO, N1G31V008 (1-SFP-V-8792).

4.1.9.24 **Verify** open RCDT OUTLET ISO N1G21HV7127 (N1G21V006).

4.1.9.25 **Verify** open RCDT RECIRC ISO, N1G21HV7144 (N1G21V106).

4.1.9.26 **Place** the RCDT in service per Section 4.1.2.

4.1.10 Establishing a Hydrogen Blanket in the RCDT.

4.1.10.1 **Verify** that the oxygen concentration in the RCDT gas space is less than 5% by volume.

4.1.10.2 RCDT system is aligned per system checklist FNP-1-SOP-50.0A.

4.1.10.3 An RHT is aligned for service per FNP-1-SOP-2.4, CVCS BORON RECYCLE SYSTEM.

4.1.10.4 **Close** the following RCDT vent line iso valves:

- RCDT VENT LINE ISO, Q1G21HV7126 (MCB)
- RCDT VENT LINE ISO, Q1G21HV7150 (MCB)

NOTE: Reference FNP-0-ACP-36.0, COMPRESSED GAS SAFETY, as required, before performing steps involving a gas cylinder. (AI 2002202992)

4.1.10.5 **Verify** the hydrogen bottle is attached to the supply line AND bottle isolation valves are open, THEN **open** H_2 bottle to RCDT ISO, N1G21V340.

4.1.10.6 **Close** H_2 SUPP TO RCDT, Q1G21V211 (1-LWP-V-7125).

4.1.10.7 **Open** RCDT VENT, Q1G21V192 (1-LWP-V-7163).

4.1.10.8 **Establish** excess letdown to RCDT per FNP-1-SOP-2.7, CVCS EXCESS LETDOWN.

4.1.10.9 **Start** an RCDT pump and **recirculate** tank while tank is filling to ensure air is not entrapped in lines.

4.1.10.10 WHEN water comes out of the vent, THEN **stop** the RCDT pump and **close** RCDT VENT, Q1G21V192 (1-LWP-V-7163).

4.1.10.11 **Remove** excess letdown from service per FNP-1-SOP-2.7, CVCS EXCESS LETDOWN.

4.1.10.12 **Open** H_2 SUPP TO RCDT, Q1G21V211 (1-LWP-V-7125).

4.1.10.13 **Verify** open the following valves:

- RCDT VENT LINE ISO Q1G21HV7126 (MCB).
- RCDT VENT LINE ISO Q1G21HV7150 (MCB).

4.1.10.14 **Verify** the following:

- H2 SUPP TO RCDT, Q1G21PCV7155 (Q1G21V063) is set to maintain 3.0 psig.
- GAS DISCH FROM RCDT, Q1G21PCV7152 (Q1G21V002) is set to maintain 6.0 psig.

4.1.10.15 **Start** a RCDT pump.

4.1.10.16 **Regulate** RCDT LCV, Q1G21LCV1003 (Q1G21V064) in manual to pump tank level down to 20%.

4.1.10.17 IF needed, THEN **place** RCDT in normal operation per Section 4.1.
IF NOT, **stop** the pump and **close** RCDT LCV, Q1G21LCV1003 (Q1G21V064).

4.1.10.18 IF H2 supply to the RCDT is NOT to be maintained, THEN **close** the bottle isolation valves AND **close** H_2 BOTTLE TO RCDT ISO, N1G21V340.

4.1.11 Establishing a Nitrogen Atmosphere in the RCDT (Burp Method):

4.1.11.1 RCDT system is aligned per system checklist FNP-1-SOP-50.0A, REACTOR COOLANT DRAIN COLLECTION AND DISCHARGE, and is aligned for normal operation per FNP-1-SOP-50.0, LIQUID WASTE PROCESSING SYSTEM.

4.1.11.2 The waste gas system is in service and capable of receiving gas from the RCDT.

4.1.11.3 **Close** the following valves:

- RCDT VENT LINE ISO Q1G21HV7126 (MCB)
- RCDT VENT LINE ISO Q1G21HV7150 (MCB)

4.1.11.4 **Verify** nitrogen bottle is attached to the supply line and bottle isolations are open (155' outside MSVR).

4.1.11.5 **Open** nitrogen bottle to RCDT iso. N1G21V339 (155' outside MSVR) and **close** H2 bottle to RCDT iso. N1G21V340.

4.1.11.6 **Ensure** H2 supply to RCDT 1-LWP-PCV-7155 (Q1G21V063) and gas discharge from RCDT 1-LWP-PCV-7152 (Q1G21V002) are set to maintain 3.0 psig and 6.0 psig respectively.

NOTE: When filling the RCDT, the gas discharge valve from the RCDT should be set to maintain 3 psig Q1G21V003 (1-LWP-PCV-7152) RCDT DISCH TO WPS GAS SYSTEM and Q1G21V0063 (1-LWP-PCV-7155) H2 SUPP TO RCDT should be closed if RCDT pressure is ≥ 3 psig. This will allow H_2 to be purged to the Waste Gas System.

4.1.11.7 **Verify** open the following valves (outside MSVR).

- H2 supply to RCDT N1G21V285.
- RCDT PCV Root Iso. 1-LWP-V-7165 (Q1G21V062).
- H2 Supply to RCDT PCV Iso. 1-LWP-V-7154 (Q1G21V061).

4.1.11.8 **Verify** air cut in to H_2 Supply to RCDT 1-LWP-PCV-7155 (Q1G21V063).

4.1.11.9 **Open** RCDT Vent Line Iso. Q1G21HV7126.

4.1.11.10 **Open** RCDT Vent Line Iso. Q1G21HV7150.

4.1.11.11 **Establish** RCDT pressure of 8 psig by adjusting H2 supply to RCDT 1-LWP-V-7155 (Q1G21V063) as needed. IF pressure is raised, THEN **verify** N_2 flow to the RCDT as evidenced by an increase in RCDT pressure and/or a decrease in N_2 bottle pressure. WHEN RCDT pressure is at 8 psig, THEN **adjust** H_2 supply to RCDT 1-LWP-V-7155 (Q1G21V063) to 0 psig.

NOTES:
- Sampling of the RCDT is done in the 121' Piping Penetration Room. Sampling will not necessarily be done on the first burp, but should be performed on all subsequent burps. The sample should be obtained near the end of the burp to ensure that the sample obtained is representative of the RCDT atmosphere instead of being representative of the bulk N_2 supply to the RCDT.
- An actual transfer of gas from the RCDT to the GDT must be in progress in order for Chemistry to take their sample. This evolution must be closely coordinated with Chemistry personnel.

4.1.11.12 **Notify** Chemistry to be ready to sample the RCDT during the burp, if desired.

4.1.11.13 **Set** the gas discharge from RCDT 1-LWP-PCV-7152 to maintain 3 psig (Q1G21V002).

4.1.11.14 **Verify** RCDT LCV Q1G21LCV1003 is in MANUAL and closed.

NOTE: A level hose may be used to monitor level changes in the RCDT if the installed level transmitter is not functioning properly AND containment is accessible.

4.1.11.15 **Perform** the following to raise RCDT level to approximately 90% to purge gas from the RCDT to the Waste Gas System:

a. **Stop** all operating RCDT pumps.

b. **Close** RCDT Outlet Iso N1G21HV7127.

c. **Verify** open RCDT Recirc Iso N1G21HV7144.

d. **Open** RCDT to Waste Gas Compressor suction Q1G22V010 (100'El Aux Building).

e. **Open** PRT Drain Iso. N1B31HV8031 (MCB).

CAUTION: Monitor PRT pressure during drain to RCDT to ensure a positive pressure is maintained on the PRT.

NOTE: IF it is necessary to use the RCDT pump to fill the RCDT per the following step, THEN the pump should be started and stopped as necessary to allow the gas from the RCDT atmosphere to bleed off to the waste gas system without overwhelming the waste gas compressor.

f. IF gravity drain is NOT sufficient to transfer water from the PRT, THEN **run** a RCDT pump as needed per the above note.

g. **Monitor** RCDT level, pressure, and waste gas decay tank pressure as the water transfer proceeds to ensure proper system response.

h. **Coordinate** with Chemistry personnel to obtain sample, if required, per the note preceding Step 4.1.11.12.

NOTE:	It may be necessary to fill the PRT to the normal level using FNP-1-SOP-1.2, Section 4.3

4.1.11.16 WHEN RCDT level has been raised to approximately 90% and the RCDT GAS PRESS is approximately 3 psig, THEN **perform** the following:

a. **Stop** all operating RCDT pumps.

b. **Close** PRT DRAIN ISO. N1B31V8031. (MCB)

c. **Close** RCDT to WASTE GAS COMPRESSOR SUCTION Q1G22V010 (100' Aux Building).

NOTE:	Step 4.1.11.16.d and 4.1.11.16.e may be N/A'd if the RCDT can NOT be recirculated due to valve/pump problems, etc.

d. **Open** RCDT OUTLET ISO. N1G21HV7127.

NOTE:	N_2 PRESS may have to be added to the RCDT to operate the RCDT Pumps.

e. **Start** a RCDT pump to recirc RCDT contents.

f. WHEN burp is completed as indicated by RCDT pressure falling to ≈ 3 psig, THEN **open** H_2 supply to RCDT 1-LWP-PCV-7155 (Q1G21V063) to maintain approximately 8 psig.

4.1.11.17 **Begin** lowering RCDT level to approximately 30%.

NOTES:
- RCDT drain down rate should be slow enough that H_2 SUPPLY TO RCDT 1-LWP-PCV-7155 (Q1G21V063) can maintain a positive RCDT pressure of 3 PSIG. Closely monitor RCDT pressure during drain down. Change out the N_2 cylinder outside the MSVR as required.
- IF the RCDT can NOT be pumped down due to some problem, THEN drain the RCDT using Q1G21V207 RCDT DRN.

a. Using the controller on the LWPP **throttle** open Q1G21LCV1003 to slowly lower RCDT level to 30%.

b. WHEN RCDT level is approximately 30%, THEN **close** Q1G21LCV1003 and stop the running RCDT pump.

4.1.11.18 **Repeat** Step 4.1.11.11 through 4.1.11.17 until the hydrogen concentration is acceptable for chemical degas per Chemistry group requirements.

4.1.11.19 WHEN N2 purge no longer required, THEN **close** N2 bottle to RCDT iso N1G21V339 (outside MSVR).

4.1.11.20 **Return** setting of H2 supply to RCDT 1-LWP-PCV-7155 (Q1G21V063) and gas discharge from RCDT 1-LWP-PCV-7152 (Q1G21V002) to maintain 3.0 psig and 6 psig, respectively.

4.1.11.21 **Place** MCB handswitch for RCDT LCV Q1G21LCV1003 to OPEN and **allow** to spring return to AUTO.

NOTE: Tank levels shall be monitored periodically during processing, discharge or transfer of liquid waste. ALL tank levels should be monitored, including non- source and non- destination tanks. CR# 2010102358

4.2 **WHT OPERATION**

4.2.1 WHT recirculation and sampling:

4.2.1.1 WHT system is aligned per FNP-1-SOP-50.0B.

4.2.1.2 **Start** waste evaporator feed pump.

NOTE: Prior to discharge, the WHT must be sampled and the sample checked for chromates.

4.2.1.3 **Perform** the following:

a. **Obtain** a WHT sample from the test valve downstream of Q1G21V025, WEFP DISCH PI-1016 ROOT.

b. Visually **check** sample for chromates by placing a white sheet of paper behind the sample for comparison to verify water is clear with no yellow tint.

4.2.2 WHT discharge to disposable demineralizer system:

4.2.2.1 **Proceed** per FNP-0-SOP-50.7, LIQUID WASTE PROCESSING USING THE DISPOSABLE DEMINERALIZER SYSTEM.

4.2.3 WHT discharge to the FDT:

4.2.3.1 In the 139' filter room **close** WASTE EVAP FEED FILTER OUTLET, Q1G21V019 (1-LWP-V-7244).

4.2.3.2 At the liquid waste panel **start** the waste evaporator feed pump.

4.2.3.3 In the waste evaporator feed pump room **open** WEFP DISCH TO FDT ISO, Q1G21V027 (1-LWP-V-7240).

4.2.3.4 In the waste evaporator feed pump room **open** WEFF INLET, Q1G21V020 (1-LWP-V-7239).

4.2.3.5 WHEN WHT to FDT discharge is complete, THEN **perform** the following:

a. **Stop** the waste evaporator feed pump.

b. **Close** the WEFF INLET, Q1G21V020 (1-LWP-V-7239).

4.2.3.6 **Close** WEFP DISCH TO FDT ISO, Q1G21V027 (1-LWP-V-7240).

4.2.3.7 **Open** WASTE EVAP FEED FILTER OUTLET, Q1G21V019 (1-LWP-V-7244).

4.2.4 Draining the WHT to the FDT:

NOTES:
- Health Physics coverage is required for the performance of this procedure due to the potential for contamination.
- Draining should be done at a controlled rate to reduce splashing and the spread of contamination.

4.2.4.1 **Verify** that the waste evaporator feed pump is not running.

4.2.4.2 **Verify** that WEFF INLET, Q1G21V020 (1-LWP-V-7239) is closed.

4.2.4.3 **Verify** closed WASTE GAS PROCESSING RM SUMP PUMPS DISCH TO WHT, N1G21V159A.

4.2.4.4 **Verify** open WASTE GAS PROCESSING RM SUMP PUMPS DISCH TO FDT, N1G21V159B (located in the recombiner hallway).

NOTE: Removing the drain grating will reduce splashing. Remove grating if possible.

4.2.4.5 Slowly **throttle** open the WHT DRN, Q1G21V029 (1-LWP-V-7234).

4.2.4.6 **Verify** the waste gas processing room sump pump starts and is pumping down the sump as the WHT is being drained to it. IF the pumps are not keeping up with drain rate OR the drains back up, THEN **secure** draining immediately and **contact** HP and **notify** the control room.

4.2.4.7 WHEN draining is complete, THEN **close** the WHT DRN, Q1G21V029 (1-LWP-V-7234) and **have** HP survey the area around the floor drain.

4.2.5 Waste Evaporator Feed Filter Isolation for Filter Element Replacement:

4.2.5.1 **Proceed To** Appendix 8.

NOTE: Tank levels shall be monitored periodically during processing, discharge or transfer of liquid waste. ALL tank levels should be monitored, including non- source and non- destination tanks. CR# 2010102358

4.3 **WECT OPERATIONS.**

4.3.1 WECT recirculation and sampling:

4.3.1.1 WECT system is aligned per system checklist FNP-1-SOP-50.0B.

4.3.1.2 **Close** WECT INLET ISO, Q1G21V217 (1-LWP-V-7221).

4.3.1.3 **Start** waste evaporator condensate tank pump.

4.3.1.4 **Notify** the Shift Radio Chemist to obtain a sample.

4.3.1.5 IF desired, THEN **remove** the tank from recirc by performing the following

a. **Stop** the WASTE EVAPORATOR CONDENSATE TANK PUMP

b. **Open** Q1G21V217 (1-LWP-V-7221), WECT INLET ISO

4.3.2 WECT discharge to RHT's:

4.3.2.1 Waste evap condensate pump is on and in recirculation mode per 4.3.1.

4.3.2.2 An RHT is aligned to receive tank contents per system checklist FNP-1-SOP-2.4A, CVCS BORON RECYCLE SYSTEM.

4.3.2.3 **Open** WECT PUMP DISCH TO RHT ISO, Q1G21V031 (1-LWP-V-7229).

4.3.2.4 **Open** WASTE EVAP CNDS PUMP DISCH, Q1G21V230 (1-LWP-V-7225).

4.3.2.5 WHEN discharge of WECT contents to RHT has been completed, THEN **stop** pump and **perform** the following:

a. **Close** WECT PUMP DISCH TO RHT ISO, Q1G21V031 (1-LWP-V-7229).

b. **Close** WASTE EVAP CNDS PUMP DISCH, Q1G21V230 (1-LWP-V-7225).

4.3.2.6 **Open** WECT INLET ISO, Q1G21V217 (1-LWP-V-7221).

4.3.3 WECT discharge to WHT.

4.3.3.1 WECT pump is on and in recirculation mode per 4.3.1.

In the Filter Room:

4.3.3.2 **Open** WASTE EVAP CNDS PUMP DISCH TO WHT, Q1G21V085 (1-LWP-V-7218).

4.3.3.3 **Open** WASTE EVAP CNDS FILTER OUTLET, Q1G21V084 (1-LWP-V-7217).

4.3.3.4 IF tank contents are to be routed through the waste evap condensate demineralizer, THEN **perform** the following. IF NOT, THEN **Proceed To** Step 4.3.3.5.

a. **Open** WASTE EVAP CNDS DEMIN INLET, Q1G21V086 (1-LWP-V-7203).

b. **Open** WASTE EVAP CNDS DEMIN OUTLET, Q1G21V225 (1-LWP-V-7212).

c. **Close** WASTE EVAP CNDS DEMIN BYPASS, Q1G21V216 (1-LWP-V-7213).

In the WECT Room:

4.3.3.5 **Close** WECT INLET ISO, Q1G21V217 (1-LWP-V-7221).

4.3.3.6 **Open** the following valves:

a. WASTE EVAP CNDS PUMP DISCH TO WASTE EVAP CNDS DEMIN, Q1G21V087 (1-LWP-V-7232).

b. WASTE EVAP CNDS PUMP DISCH, Q1G21V230 (1-LWP-V-7225).

(Step 4.3.3 cont'd on next page)

4.3.3.7 WHEN discharge of WECT is completed, THEN **stop** the pump and **perform** the following:

In the Filter Room:

a. IF tank contents were routed through the waste evap condensate demineralizer, THEN **perform** the following.
IF NOT, THEN **Proceed To** Step 4.3.3.7.b.

- **Close** WASTE EVAP CNDS DEMIN INLET, Q1G21V086 (1-LWP-V-7203).
- **Close** WASTE EVAP CNDS DEMIN OUTLET, Q1G21V225 (1-LWP-V-7212).
- **Open** WASTE EVAP CNDS DEMIN BYPASS, Q1G21V216 (1-LWP-V-7213).

b. **Close** WASTE EVAP CNDS FILTER OUTLET, Q1G21V084 (1-LWP-V-7217).

- **Close** WASTE EVAP CNDS PUMP DISCH TO WHT, Q1G21V085 (1-LWP-V-7218).

In the WECT Room:

- **Open** WECT INLET ISO, Q1G21V217 (1-LWP-V-7221).
- **Close** WASTE EVAP CNDS PUMP DISCH TO WASTE EVAP CNDS DEMIN, Q1G21V087 (1-LWP-V-7232).
- **Close** WASTE EVAP CNDS PUMP DISCH, Q1G21V230 (1-LWP-V-7225).

NOTE:	Tank levels shall be monitored periodically during processing, discharge or transfer of liquid waste. ALL tank levels should be monitored, including non- source and non- destination tanks. CR# 2010102358

4.3.4 WECT discharge to #2 WMT:

4.3.4.1 WECT pump is on and in recirculation mode per 4.3.1.

4.3.4.2 IF tank contents are to be routed through the WMT demineralizer, THEN **perform** the following.
IF NOT, THEN **Proceed To** Step 4.3.4.3.

- **Open** WMT DEMIN OUTLET, Q1G21V094 (1-LWP-V-7434) [demin valve area].

In the Filter Room:

- **Close** #2 WMT DEMIN BYP, Q1G21V125 (1-LWP-V-7428).
- **Open** WMT DEMIN DISCH TO #2 WMT, Q1G21V093B (1-LWP-V-7438B).
- **Open** FDT TO WMT DEMIN, Q1G21V091B (1-LWP-V-7452B).

4.3.4.3 IF tank contents are to be routed through the waste evaporator condensate demineralizer, THEN **perform** the following.
IF NOT, THEN **proceed** to Step 4.3.4.4.

- **Open** WASTE EVAP CNDS DEMIN INLET, Q1G21V086 (1-LWP-V-7203).
- **Open** WASTE EVAP CNDS DEMIN OUTLET, Q1G21V225 (1-LWP-V-7212).
- **Close** WASTE EVAP CNDS DEMIN BYP, Q1G21V216 (1-LWP-V-7213).

4.3.4.4 **Open** WASTE EVAP CNDS FILTER OUTLET, Q1G21V084 (1-LWP-V-7217).

4.3.4.5 **Open** WASTE EVAP CNDS TANK DISCH TO WMT, Q1G21V220 (1-LWP-V-7219).

In the WECT Room:

4.3.4.6 **Verify** closed WECT INLET ISO, Q1G21V217 (1-LWP-V-7221).

4.3.4.7 **Open** the following valves:

- WASTE EVAP CNDS PUMP DISCH, Q1G21V230 (1-LWP-V-7225).
- WASTE EVAP CNDS PUMP DISCH TO WASTE EVAP CNDS DEMIN, Q1G21V087 (1-LWP-V-7232).

4.3.4.8 **Estimate** the time that the WMT tank will reach 80% level. The estimated time to reach 80% may be determined by timing the WMT level increase for at least 5% and extrapolating the time to reach 80%. (IR 2-96-167)

4.3.4.9 WHEN the WMT reaches 80%, THEN continuously **monitor** the WMT level indication to ensure the WMT filling is secured prior to exceeding 85%. (IR 2-96-167)

CAUTION: The WECT is subject to siphoning when pumping to a WMT. Closing WASTE EVAP CNDS TANK DISCH TO WMT, Q1G21V220, after stopping the waste condensate pump will prevent possible overflowing of the WMT.

4.3.4.10 WHEN discharge of WECT is completed, THEN **stop** the pump and **perform** the following:

In the Filter Room:

a. **Close** WASTE EVAP CNDS TANK DISCH TO WMT, Q1G21V220 (1-LWP-V-7219). (Filter Room)

b. **Close** WASTE EVAP CNDS FILTER OUTLET, Q1G21V084 (1-LWP-V-7217). (Filter Room)

c. IF tank contents were routed through the waste evap condensate demineralizer, THEN **perform** the following: IF NOT, **proceed** to Step 4.3.4.10.d.

- **Close** WASTE EVAP CNDS DEMIN INLET, Q1G21V086 (1-LWP-V-7203).
- **Close** WASTE EVAP CNDS DEMIN OUTLET, Q1G21V225 (1-LWP-V-7212).
- **Open** WASTE EVAP CNDS DEMIN BYP, Q1G21V216 (1-LWP-V-7213).

d. IF WECT was routed through the WMT demineralizer, THEN **perform** the following:
IF NOT, THEN **Proceed To** Step 4.3.4.10.f.

- **Open** #2 WMT DEMIN BYPASS, Q1G21V125 (1-LWP-V-7428).
- **Close** WMT DEMIN DISCH TO #2 WMT, Q1G21V093B (1-LWP-V-7438B).
- **Close** FDT TO WMT DEMIN, Q1G21V091B (1-LWP-V-7452B).

At the WMT Demin Valve area:

e. IF the WECT contents were routed through the WMT demineralizer, THEN **close** WMT DEMIN OUTLET, Q1G21V094 (1-LWP-V-7434) [located at WMT demin valve area].

In the WECT Room:

f. **Close** WASTE EVAP CNDS PUMP DISCH, Q1G21V230 (1-LWP-V-7225).

g. **Close** WASTE EVAP CNDS PUMP DISCH TO WASTE EVAP CNDS DEMIN, Q1G21V087 (1-LWP-V-7232).

h. **Open** WECT INLET ISO, Q1G21V217 (1-LWP-V-7221).

NOTE:	Tank levels shall be monitored periodically during processing, discharge or transfer of liquid waste. ALL tank levels should be monitored, including non- source and non- destination tanks. CR# 2010102358

4.3.5 WECT discharge to #1 WMT:

4.3.5.1 WECT pump is on and in recirculation mode per 4.3.1.

4.3.5.2 In the WMT pump room, **close** #2 WMT INLET ISO, Q1G21V135 (1-LWP-V-7429).

4.3.5.3 IF tank contents are to be routed through the WMT demin, THEN **perform** the following.
IF NOT, THEN **Proceed To** Step 4.3.5.4.

- **Open** WMT DEMIN OUTLET, Q1G21V094 (1-LWP-V-7434) [WMT demineralizer valve area].

In the Filter Rooms:

a. **Close** #2 WMT DEMIN BYP, Q1G21V125 (1-LWP-V-7428)

b. **Close** LHST DISCH TO #1 WMT ISO, Q1G21V089 (1-LWP-V-7412).

c. **Open** WMT DEMIN DISCH TO #1 WMT, Q1G21V093A (1-LWP-V-7438A).

d. **Open** FDT TO WMT DEMIN, Q1G21V091B (1-LWP-V-7452B).

e. **Proceed To** Step 4.3.5.5.

4.3.5.4 WHEN bypassing the WMT demineralizer, THEN **perform** the following:

- **Open** WMT DEMIN DISCH TO #1 WMT, Q1G21V093A (1-LWP-V-7438A).
- **Open** WMT DEMIN DISCH TO #2 WMT, Q1G21V093B (1-LWP-V-7438B).
- **Close** LHST DISCH TO #1 WMT ISO, Q1G21V089 (1-LWP-V-7412).

4.3.5.5 IF tank contents are to be routed through the waste evap condensate demineralizer, THEN **perform** the following. IF NOT, THEN **proceed To** Step 4.3.5.6.

- **Open** WASTE EVAP CNDS DEMIN INLET, Q1G21V086 (1-LWP-V-7203).
- **Open** WASTE EVAP CNDS DEMIN OUTLET, Q1G21V225 (1-LWP-V-7212).
- **Close** WASTE EVAP CNDS DEMIN BYPASS, Q1G21V216 (1-LWP-V-7213).

4.3.5.6 **Open** WASTE EVAP CNDS FILTER OUTLET, Q1G21V084 (1-LWP-V-7217).

4.3.5.7 **Open** WASTE EVAP CNDS TANK DISCH TO WMT, Q1G21V220 (1-LWP-V-7219).

In the Waste Evaporator Condensate Tank Room:

4.3.5.8 **Check** closed WECT INLET ISO, Q1G21V217 (1-LWP-V-7221).

4.3.5.9 **Open** the following valves:

- WASTE EVAP CNDS PUMP DISCH, Q1G21V230 (1-LWP-V-7225).
- WASTE EVAP CNDS PUMP DISCH TO WASTE EVAP CNDS DEMIN, Q1G21V087 (1-LWP-V-7232).

4.3.5.10 **Estimate** the time that the WMT tank will reach 80% level. The estimated time to reach 80% may be determined by timing the WMT level increase for at least 5% and extrapolating the time to reach 80%. (IR 2-96-167)

4.3.5.11 WHEN the WMT reaches 80%, THEN continuously **monitor** the WMT level indication to ensure the WMT filling is secured prior to exceeding 85%. (IR 2-96-167)

CAUTION: The WECT is subject to siphoning when pumping to a WMT. Therefore, upon stopping the waste evap condensate pump, steps 4.3.5.12 through 4.3.5.16 should be completed expeditiously.

4.3.5.12 WHEN discharge of WECT is completed, THEN **stop** the pump and **perform** the following:

In the Filter Room:

a. IF tank contents were routed through the waste evap condensate demin, THEN **perform** the following.
IF NOT, THEN **Proceed To** Step 4.3.5.12.b.

- **Close** WASTE EVAP CNDS DEMIN INLET, Q1G21V086 (1-LWP-V-7203).
- **Close** WASTE EVAP CNDS DEMIN OUTLET, Q1G21V225 (1-LWP-V-7212).
- **Open** WASTE EVAP CNDS DEMIN BYPASS, Q1G21V216 (1-LWP-V-7213).

b. IF tank contents bypassed the waste evap condensate demin, THEN **perform** the following:

- **Close** WASTE EVAP CNDS FILTER OUTLET, Q1G21V084 (1-LWP-V-7217).
- **Close** WASTE EVAP CNDS TANK DISCH TO WMT, Q1G21V220 (1-LWP-V-7219).

c. IF WECT was routed through the WMT demin, THEN **perform** the following.
IF NOT, THEN **Proceed To** Step 4.3.5.12.d.

1. **Open** #2 WMT DEMIN BYP, Q1G21V125 (1-LWP-V-7428).
2. **Close** WMT DEMIN DISCH TO #1 WMT, Q1G21V093A (1-LWP-V-7438A).
3. **Close** FDT TO WMT DEMIN, Q1G21V091B (1-LWP-V-7452B).
4. **Open** LHST DISCH TO #1 WMT ISO, Q1G21V089 (1-LWP-V-7412).
5. **Proceed To** step 4.3.5.13.

d. IF WECT contents bypassed WMT demineralizer, THEN **perform** the following:

- **Close** WMT DEMIN DISCH TO #1 WMT, Q1G21V093A (1-LWP-V-7438A).
- **Open** LHST DISCH TO #1 WMT ISO, Q1G21V089 (1-LWP-V-7412).
- **Close** WMT DEMIN DISCH TO #2 WMT, Q1G21V093B (1-LWP-V-7438B).

4.3.5.13 **Close** or **verify** closed WASTE EVAP CNDS FILTER OUTLET, Q1G21V084 (1-LWP-V-7217).

4.3.5.14 **Close** or **verify** closed WASTE EVAP CNDS TANK DISCH TO WMT, Q1G21V220 (1-LWP-V-7219).

4.3.5.15 IF tank contents were routed through the WMT demineralizer, THEN **close** WMT DEMIN OUTLET, Q1G21V094 (1-LWP-V-7434) (WMT demin valve area.)

4.3.5.16 **Close** WASTE EVAP CNDS PUMP DISCH TO WASTE EVAP CNDS DEMIN, Q1G21V087 (1-LWP-V-7232) (WECT room)

4.3.5.17 **Close** WASTE EVAP CNDS PUMP DISCH, Q1G21V230 (1-LWP-V-7225) (WECT room).

4.3.5.18 **Open** WECT INLET ISO, Q1G21V217 (1-LWP-V-7221) (WECT room).

4.3.5.19 IF NOT on recirc per FNP-1-SOP-50.1 LIQUID WASTE PROCESSING SYSTEM LIQUID WASTE RELEASE FROM WASTE MONITOR TANK, THEN **open** #2 WMT INLET ISO, Q1G21V135 (1-LWP-V-7429) (WMT room).

4.3.6 WECT discharge to disposable demineralizer system:

4.3.6.1 **Proceed** per FNP-0-SOP-50.7, LIQUID WASTE PROCESSING USING THE DISPOSABLE DEMINERALIZER SYSTEM.

NOTE: Tank levels shall be monitored periodically during processing, discharge or transfer of liquid waste. ALL tank levels should be monitored, including non- source and non- destination tanks. CR# 2010102358

4.3.7 Draining the contents of a contaminated WECT:

CAUTION: The WECT should not be drained to less than 5% to prevent admission of air under the diaphragm.

4.3.7.1 **Ensure** sufficient capacity exists in the WHT to receive the contents to be drained from the WECT.

4.3.7.2 IF the WECT is on recirc, THEN **Go To** step 4.3.1.5 and **remove** from recirc.

4.3.7.3 **Open** the WECT DRN, Q1G21V235 (1-LWP-V-7223) to drain contents of WECT to the WHT.

4.3.7.4 When WECT draining is completed, then **close** WECT DRN Q1G21V235 (1-LWP-V-7223).

4.3.7.5 **Proceed To** Section 4.2 for processing the WHT.

NOTE: Tank levels shall be monitored periodically during processing, discharge or transfer of liquid waste. ALL tank levels should be monitored, including non- source and non- destination tanks. CR# 2010102358

4.4 **CDT OPERATION**

4.4.1 Draining the CDT to the WHT:

4.4.1.1 **Verify** WHT level ≥ 30% and < 90%.

4.4.1.2 **Attach** hose to CDT DRN, Q1G21V238 (1-LWP-V-7327) and **route** to equipment drain.

4.4.1.3 Slowly **open** CDT DRN, Q1G21V238 (1-LWP-V-7327).

4.4.1.4 **Drain** CDT to approximately 5-15% level.

4.4.1.5 **Close** CDT DRN, Q1G21V238 (1-LWP-V-7327).

4.4.1.6 **Remove** hose.

NOTE: Two OPS personnel will be required for this task and a catch bag should be installed below the vent line to prevent the potential spread of contamination in case of overflow while applying air to the CDT.

4.4.2 Unclogging the CDT Drain:

4.4.2.1 **Coordinate** with HP for coverage.

4.4.2.2 **Verify** closed CDT DRN, Q1G21V238.

NOTE: In the following step, the purpose of the vent valve in line with the air hose is to allow pressure to be vented from the hose before disconnecting from the SA connection and the CDT drain.

4.4.2.3 **Obtain** air hose with a flow restrictor and vent valve.

4.4.2.4 **Verify** air hose vent valve closed.

4.4.2.5 **Connect** air hose to the nearest SA connection.

4.4.2.6 **Connect** air hose to the CDT DRN, Q1G21V238.

4.4.2.7 Slowly **throttle** open the SA ISO valve.

CAUTION:	Opening CDT DRN, Q1G21V238 too quickly or too far may result in blowing contaminated water out of the tank vent. Listen and feel for air flow through the drain line while throttling the valve open to prevent overflow of the tank.

4.4.2.8 **Initiate** air flow to dislodge the clog per the following:

4.4.2.8.1 Slowly **throttle** open Q1G21V238 to dislodge debris.

4.4.2.8.2 **Monitor** tank overflow and **close** Q1G21V238 if overflowing.

4.4.2.8.3 WHEN air flow is heard through the drain line, THEN **close** Q1G21V238.

4.4.2.9 **Close** the SA ISO valve.

4.4.2.10 **Perform** the following:

4.4.2.10.1 Carefully **vent** the air hose using the air hose vent valve.

4.4.2.10.1 **Disconnect** air hose from SA connection.

4.4.2.10.2 **Coordinate** with HP for removal of air hose from drain line to check for proper draining.

4.4.2.11 **Perform** section 4.4.1 and **check** for proper draining.

4.4.2.12 IF no **drain** flow, THEN **repeat** steps 4.4.2.2 through 4.4.2.10 as necessary to clear line.

4.4.2.13 IF **drain** flow is adequate, THEN **coordinate** with HP for removal and storage of air hose and connections used.

NOTE: Tank levels shall be monitored periodically during processing, discharge or transfer of liquid waste. ALL tank levels should be monitored, including non- source and non- destination tanks. CR# 2010102358

4.5 FDT SYSTEM DISCHARGE

CAUTION: IF it is known OR suspected that chromates are present in the FDT, THEN notify the Shift Chemist prior to transferring or processing the tank.

4.5.1 FDT Recirculation and Sampling:

4.5.1.1 FDT system is aligned per system checklist FNP-1-SOP-50.0C.

NOTES:

- Sampling is required prior to transferring waste between units, prior to direct transfer to a WMT, or if chromates or other chemicals are suspected of being in the source tank.
- Sampling may be waived with Chemistry concurrence if repetitive draining of a system is being performed and previous samples have been within limits.

4.5.1.2 **Start** FDT pump and IF required, **notify** the Shift Radio Chemist to obtain sample.

CAUTION: The contents of the FDT must be sampled and the sample analyzed prior to discharge to a WMT, unless waived per previous note.

NOTE: Tank levels shall be monitored periodically during processing, discharge or transfer of liquid waste. ALL tank levels should be monitored, including non- source and non- destination tanks. CR# 2010102358

4.5.2 FDT discharge to #2 waste monitor tank (WMT):

4.5.2.1 FDT pump is on and in recirculation mode as per 4.5.1.

4.5.2.2 IF FDT contents are to be processed through the WMT demineralizer, THEN **perform** the following.
IF NOT, THEN **Proceed To** Step 4.5.2.3.

- **Open** WMT DEMIN OUTLET, Q1G21V094 (1-LWP-V-7434) [WMT demineralizer valve area].

In the Filter Room:

- **Close** #2 WMT DEMIN BYP, Q1G21V125 (1-LWP-V-7428).
- **Open** FDT TO WMT DEMIN, Q1G21V091B (1-LWP-V-7452B).
- **Open** WMT DEMIN DISCH TO #2 WMT, Q1G21V093B (1-LWP-V-7438B).

4.5.2.3 **Close** FDT DISCH TO WASTE EVAP, Q1G21V267 (1-LWP-V-7427).

4.5.2.4 **Open** FDT FILTER OUTLET, Q1G21V189 (1-LWP-V-7456).

In the FDT Pump Room:

4.5.2.5 **Open** FDT STRAINER DISCH, N1G21V118 (1-LWP-V-7421).

4.5.2.6 **Estimate** the time that the WMT tank will reach 80% level. The estimated time to reach 80% may be determined by timing the WMT level increase for at least 5% and extrapolating the time to reach 80%. (IR 2-96-167)

4.5.2.7 WHEN the WMT reaches 80%, THEN continuously **monitor** the WMT level indication to ensure the WMT filling is secured prior to exceeding 85%. (IR 2-96-167)

4.5.2.8 WHEN discharge of FDT is completed, THEN **stop** the pump and **perform** the following alignments:

a. IF tank contents were routed through the WMT demineralizer, THEN **perform** the following.
IF NOT, THEN **Proceed To** Step 4.5.2.8.b.

- **Close** WMT DEMIN OUTLET, Q1G21V094 (1-LWP-V-7434) (At WMT demineralizer valve area).

In the Filter Room:

- **Open** #2 WMT DEMIN BYP, Q1G21V125 (1-LWP-V-7428).
- **Close** FDT TO WMT DEMIN, Q1G21V091B (1-LWP-V-7452B).
- **Close** WMT DEMIN DISCH TO #2 WMT, Q1G21V093B (1-LWP-V-7438B).

b. **Close** FDT FILTER OUTLET, Q1G21V189 (1-LWP-V-7456).

c. **Open** FDT DISCH TO WASTE EVAP, Q1G21V267 (1-LWP-V-7427).

In the FDT Pump Room:

- **Close** FDT STRAINER DISCH, N1G21V118 (1-LWP-V-7421).

CAUTION:	The contents of the FDT must be sampled and the sample analyzed prior to discharge to a WMT, unless waived per previous note.

NOTE:	Tank levels shall be monitored periodically during processing, discharge or transfer of liquid waste. ALL tank levels should be monitored, including non- source and non- destination tanks. CR# 2010102358

4.5.3 FDT discharge to #1 WMT:

4.5.3.1 FDT pump is on and in recirculation mode per 4.5.1.

4.5.3.2 IF FDT contents are to be processed through the WMT demineralizer, THEN **perform** the following.
IF NOT, THEN **Proceed To** Step 4.5.3.3.

- **Open** WMT DEMIN OUTLET, Q1G21V094 (1-LWP-V-7434) (at WMT demin valve area).

In the Filter Rooms:

- **Close** #2 WMT DEMIN BYP, Q1G21V125 (1-LWP-V-7428).
- **Open** FDT TO WMT DEMIN, Q1G21V091B (1-LWP-V-7452B).
- **Open** WMT DEMIN DISCH TO #1 WMT, Q1G21V093A (1-LWP-V-7438A).

a. **Proceed To** Step 4.5.3.5.

4.5.3.3 **Open** WMT DEMIN DISCH TO #2 WMT, Q1G21V093B (1-LWP-V-7438B).

4.5.3.4 **Open** WMT DEMIN DISCH TO #1 WMT, Q1G21V093A (1-LWP-V-7438A).

4.5.3.5 **Close** FDT DISCH TO WASTE EVAP, Q1G21V267 (1-LWP-V-7427).

4.5.3.6 **Open** FDT FILTER OUTLET, Q1G21V189 (1-LWP-V-7456).

In the WMT Pump Room:

4.5.3.7 **Close** #2 WMT INLET ISO, Q1G21V135 (1-LWP-V-7429).

In the FDT Pump Room:

4.5.3.8 **Open** FDT STRAINER DISCH, N1G21V118 (1-LWP-V-7421).

4.5.3.9 **Estimate** the time that the WMT tank will reach 80% level. The estimated time to reach 80% may be determined by timing the WMT level increase for at least 5% and extrapolating the time to reach 80%. (IR 2-96-167)

4.5.3.10 WHEN the WMT reaches 80%, THEN continuously **monitor** the WMT level indication to ensure the WMT filling is secured prior to exceeding 85%. (IR 2-96-167)

4.5.3.11 WHEN discharge of FDT is completed, THEN **stop** the pump and **perform** the following alignments:

a. IF tank contents were routed through the WMT demineralizer, THEN **perform** the following.
IF NOT, THEN **Proceed To** Step 4.5.3.12.

- **Close** WMT DEMIN OUTLET, Q1G21V094 (1-LWP-V-7434) (at WMT demineralizer valve area).

In the Filter Rooms:

- **Open** #2 WMT DEMIN BYP, Q1G21V125 (1-LWP-V-7428).
- **Close** FDT TO WMT DEMIN, Q1G21V091B (1-LWP-V-7452B).
- **Close** WMT DEMIN DISCH TO #1 WMT, Q1G21V093A (1-LWP-V-7438A).

b. **Proceed To** Section 4.5.3.14.

4.5.3.12 **Close** WMT DEMIN DISCH TO #2 WMT, Q1G21V093B (1-LWP-V-7438B).

4.5.3.13 **Close** WMT DEMIN DISCH TO #1 WMT, Q1G21V093A (1-LWP-V-7438A).

4.5.3.14 **Perform** the following:

- **Close** FDT FILTER OUTLET, Q1G21V189 (1-LWP-V-7456).
- **Open** FDT DISCH TO WASTE EVAP, Q1G21V267 (1-LWP-V-7427)

In the WMT Pump Room:

4.5.3.15 IF NOT on recirc per FNP-1-SOP-50.1 LIQUID WASTE PROCESSING SYSTEM LIQUID WASTE RELEASE FROM WASTE MONITOR TANK, THEN **open** #2 WMT INLET ISO, Q1G21V135 (1-LWP-V-7429).

In the FDT Pump Room:

4.5.3.16 **Close** FDT STRAINER DISCH, N1G21V118 (1-LWP-V-7421).

4.5.4 FDT discharge to WHT:

4.5.4.1 FDT pump is on and in recirculation mode per 4.5.1.

In the Filter Room:

4.5.4.2 **Close** FDT DISCH TO WASTE EVAP, Q1G21V267 (1-LWP-V-7427).

4.5.4.3 **Open** FDT DISCHARGE TO WHT, Q1G21V123 (1-LWP-V-7426).

In FDT Pump Room:

4.5.4.4 **Open** FDT STRAINER DISCH, N1G21V118 (1-LWP-V-7421).

4.5.4.5 WHEN discharge of the FDT is completed, THEN **stop** the pump and **perform** the following alignment:

In the Filter Room:

- **Close** FDT discharge to WHT 1-LWP-V-7426 (Q1G21V123).
- **Open** FDT disch to waste evap 1-LWP-V-7427 (Q1G21V267)

In the FDT Pump Room:

- **Close** FDT STRAINER DISCH, N1G21V118 (1-LWP-V-7421).

4.5.5 FDT discharge to disposable demineralizer:

4.5.5.1 **Proceed To** FNP-0-SOP-50.7, LIQUID WASTE PROCESSING USING THE DISPOSABLE DEMINERALIZER SYSTEM.

4.5.6 Floor Drain Tank Filter Isolation for Filter Element Replacement:

4.5.6.1 **Proceed To** Appendix 2.

4.5.7 Floor Drain Tank Strainer Isolation for Basket Cleaning or Replacement:

4.5.7.1 **Proceed To** Appendix 3

4.6 **#1(2) WASTE MONITOR TANK OPERATION.**

4.6.1 #1(2) Waste Monitor Tank recirculation and sampling for discharge to the environment:

4.6.1.1 **Perform** FNP-1-SOP-50.1 APPENDIX 1(2) WASTE MONITOR TANK 1(2) RELEASE TO THE ENVIRONMENT.

NOTE: Tank levels shall be monitored periodically during processing, discharge or transfer of liquid waste. ALL tank levels should be monitored, including non- source and non- destination tanks. CR# 2010102358

4.6.2 #1(2) WMT discharge to WHT:

4.6.2.1 **Close** #1(2) WMT INLET ISO, Q1G21V090 (Q1G21V135).

4.6.2.2 **Verify** closed, #1(2) WMT PUMP DISCH, N1G21V108B (N1G21V108A).

4.6.2.3 **Start** #1(2) WMT Pump.

In the Filter Rooms:

4.6.2.4 **Close** FDT DISCH TO WASTE EVAP, Q1G21V267 (1-LWP-V-7427).

4.6.2.5 **Open** FDT DISCHARGE TO WHT, Q1G21V123 (1-LWP-V-7426).

In the WMT Pump Room:

4.6.2.6 **Open** #1(2) WMT DISCH TO FDT, Q1G21V115 (Q1G21V266).

4.6.2.7 **Open** #1(2) WMT PUMP DISCH, N1G21V108B (N1G21V108A).

4.6.2.8 WHEN discharge of tank contents is completed, THEN **stop** the #1(2) waste monitor tank pump and **perform** the following:

In the Filter Room:

- **Close** FDT DISCHARGE TO WHT, Q1G21V123 (1-LWP-V-7426).
- **Open** FDT DISCH TO WASTE EVAP, Q1G21V267 (1-LWP-V-7427).

In the WMT Pump Room:

- **Close** #1(2) WMT DISCH TO FDT, Q1G21V115 (Q1G21V266).
- **Close** #1(2) WMT PUMP DISCH, N1G21V108B (N1G21V108A).
- **Open** #1(2) WMT INLET ISO, Q1G21V090 (Q1G21V135).

NOTE: Tank levels shall be monitored periodically during processing, discharge or transfer of liquid waste. ALL tank levels should be monitored, including non- source and non- destination tanks. CR# 2010102358

4.6.3 #1(2) WMT discharge to Unit 2 #1(2) WMT:

4.6.3.1 **Close** #1(2) WMT INLET ISO, Q1G21V090 (Q1G21V135).

4.6.3.2 **Verify** closed, #1(2) WMT PUMP DISCH, N1G21V108B (N1G21V108A).

4.6.3.3 **Start** #1(2) WMT Pump.

4.6.3.4 **Close** DISPOSABLE DEMIN SYS INLET FROM WHT & FDT, N2G21V345.

NOTE: The following Step will flush contaminated water out of Disposable Demineralizer system inlet piping to Unit 2 WHT.

4.6.3.5 **Open** Unit 2 FLOOR DRN TANK DISCH TO WHT, Q2G21V123 (2-LWP-V-7426).

4.6.3.6 **Open** #1(2) WMT DISCH TO FDT, Q1G21V115 (Q1G21V266).

4.6.3.7 **Open** #1(2) WMT PUMP DISCH, N1G21V108B (N1G21V108A).

a. **Flush** approximately 100-200 gallons (2-4% level) from the Unit 1 WMT to the Unit 2 WHT then **close** Unit 2 FLOOR DRN TANK DISCH TO WHT, Q2G21V123 (2-LWP-V-7426).

b. **Close** the inlet to the WMT that is NOT to be filled, Unit 2 #1(2) WMT INLET ISO, Q2G21V090 (Q2G21V135).

c. **Open** Unit 2 FLOOR DRAIN TANK FILTER OUTLET Q2G21V189 (2-LWP-V-7456) to start discharge to Unit 2 #1(2) WMT.

4.6.3.8 **Estimate** the time that the WMT tank will reach 80% level. The estimated time to reach 80% may be determined by timing the WMT level increase for at least 5% and extrapolating the time to reach 80%. (IR 2-96-167)

4.6.3.9 WHEN the WMT reaches 80%, THEN continuously **monitor** the WMT level indication to ensure the WMT filling is secured prior to exceeding 85%. (IR 2-96-167)

4.6.3.10 WHEN discharge of tank contents is complete, THEN **stop** #1(2) Waste Monitor Pump and **perform** following:

- **Close** #1(2) WMT DISCH TO FDT, Q1G21V115 (Q1G21V266).
- **Close** #1(2) WMT PUMP DISCH, N1G21V108B (N1G21V108A).
- **Close** Unit 2 FLOOR DRAIN TANK FILTER OUTLET Q2G21V189 (2-LWP-V-7456).
- **Open** DISPOSABLE DEMIN SYS INLET FROM WHT & FDT, N2G21V345.
- **Open** the inlet to the WMT that was closed in Step 4.6.3.7.b, Unit 2 #1(2) WMT INLET ISO, Q2G21V090 (Q2G21V135).
- **Open** #1(2) WMT INLET ISO, Q1G21V090 (Q1G21V135).

4.6.4 #1(#2)WMT discharge to disposable demineralizer system:

4.6.4.1 **Proceed** per FNP-0-SOP-50.7, LIQUID WASTE PROCESSING USING THE DISPOSABLE DEMINERALIZER SYSTEM.

4.7 **#1(2) WMT RECIRCULATION THROUGH THE WMT DEMINERALIZER.**

4.7.1 **Refer To** FNP-1-SOP-50.1, LIQUID WASTE PROCESSING SYSTEM LIQUID WASTE RELEASE FROM WASTE MONITOR TANK.

4.8 **EDUCTING DIAPHRAGM ON WECT.**

4.8.1 **Verify** Waste Evaporator Condensate Tank aligned to receive water per FNP-0-SOP-50.7, LIQUID WASTE PROCESSING USING THE DISPOSABLE DEMINERALIZER SYSTEM.

4.8.2 **Attach** Tygon hose from WASTE EVAP CNDS TANK VENT, Q1G21V354.

4.8.2.1 **Verify** routed to polybottle or to WHT via drain header.

4.8.2.2 WHEN hose has been routed, THEN **open** WASTE EVAP CNDS TANK VENT, Q1G21V354.

4.8.3 **Proceed** with water transfer per FNP-0-SOP-50.7, LIQUID WASTE PROCESSING USING THE DISPOSABLE DEMINERALIZER SYSTEM, until air-free water emitted from vent valve.

4.8.4 Immediately **close** WASTE EVAP CNDS TANK VENT, Q1G21V354 and **secure** input to Waste Evaporator Condensate tank per FNP-0-SOP-50.7, LIQUID WASTE PROCESSING USING THE DISPOSABLE DEMINERALIZER SYSTEM.

4.8.5 **Disconnect** vent rig from WASTE EVAP CNDS TANK VENT, Q1G21V354.

4.9 LHST OPERATION

4.9.1 LHST recirculation:

4.9.1.1 LHST system is aligned per system checklist FNP-1-SOP-50.0E.

4.9.1.2 **Start** the LHST pump and **recirculate** tank contents.

NOTES:

- #1 WMT is the normal path for the LHST and sampling is not routinely performed.
- Tank levels shall be monitored periodically during processing, discharge or transfer of liquid waste. ALL tank levels should be monitored, including non-source and non-destination tanks. CR# 2010102358

4.9.2 LHST discharge to #1 WMT:

4.9.2.1 LHST pump is on and in recirculation mode per 4.9.1.

4.9.2.2 IF LHST contents are to be routed through the WMT demineralizer, THEN **perform** the following.
IF NOT, THEN **proceed To** Step 4.9.2.3.

a. **Close** LHST DISCH TO #1 WMT ISO, Q1G21V089 (1-LWP-V-7412).

b. **Open** LAUNDRY & HOT SHOWER TANK TO WMT DEMIN, Q1G21V091A (1-LWP-V-7452A).

c. **Open** WMT DEMIN DISCH TO #1 WMT, Q1G21V093A (1-LWP-V-7438A).

d. **Open** WMT DEMIN OUTLET, Q1G21V094 (1-LWP-V-7434).

4.9.2.3 **Open** LHST PUMP DISCH STRAINER OUTLET ISO, N1G21V084 (1-LWP-V-7407).

4.9.2.4 **Estimate** the time that the WMT tank will reach 80% level. The estimated time to reach 80% may be determined by timing the WMT level increase for at least 5% and extrapolating the time to reach 80%. (IR 2-96-167)

4.9.2.5 WHEN the WMT reaches 80%, THEN continuously **monitor** the WMT level indication to ensure the WMT filling is secured prior to exceeding 85%. (IR 2-96-167)

4.9.2.6 WHEN discharge of LHST is completed, THEN **stop** the pump and **perform** the following alignments:

a. IF tank contents were routed through the waste monitor tank demineralizer, THEN **perform** the following.
IF NOT, THEN **Proceed To** Step 4.9.2.7.

- **Open** LHST DISCH TO #1 WMT ISO, Q1G21V089 (1-LWP-V-7412).
- **Close** WMT DEMIN OUTLET, Q1G21V094 (1-LWP-V-7434).
- **Close** LAUNDRY & HOT SHOWER TANK TO WMT DEMIN, Q1G21V091A (1-LWP-V-7452A).
- **Close** WMT DEMIN DISCH TO #1 WMT, Q1G21V093A (1-LWP-V-7438A).

4.9.2.7 **Close** LHST PUMP DISCH STRAINER OUTLET ISO, N1G21V084 (1-LWP-V-7407).

4.9.3 LHST discharge to #2 WMT:

NOTES:
- Transferring the LHST to the #2 WMT is not a normal operation, and should be used only in an emergency, with SS permission.
- Tank levels shall be monitored periodically during processing, discharge or transfer of liquid waste. ALL tank levels should be monitored, including non-source and non-destination tanks. CR# 2010102358

4.9.3.1 LHST pump is on and in recirculation mode as per 4.9.1.

4.9.3.2 IF LHST contents are to be routed through the WMT demineralizer, THEN **perform** the following:
IF NOT, THEN **Proceed To** Step 4.9.3.3.

a. **Open** LAUNDRY & HOT SHOWER TANK TO WMT DEMIN, Q1G21V091A (1-LWP-V-7452A).

b. **Open** WMT DEMIN DISCH TO #2 WMT, Q1G21V093B (1-LWP-V-7438B)

c. **Open** WMT DEMIN OUTLET, Q1G21V094 (1-LWP-V-7434)

d. **Proceed To** Step 4.9.3.5.

4.9.3.3 **Open** WMT DEMIN DISCH TO #1 WMT, Q1G21V093A (1-LWP-V-7438A).

4.9.3.4 **Open** WMT DEMIN DISCH TO #2 WMT, Q1G21V093B (1-LWP-V-7438B).

4.9.3.5 **Close** #2 WMT DEMIN BYP, Q1G21V125 (1-LWP-V-7428).

4.9.3.6 **Close** #1 WMT INLET ISO, Q1G21V090 (1-LWP-V-7413).

4.9.3.7 **Open** LHST PUMP DISCH STRAINER OUTLET ISO, N1G21V084 (1-LWP-V-7407).

4.9.3.8 **Estimate** the time that the WMT tank will reach 80% level. The estimated time to reach 80% may be determined by timing the WMT level increase for at least 5% and extrapolating the time to reach 80%. (IR 2-96-167)

4.9.3.9 WHEN the WMT reaches 80%, THEN continuously **monitor** the WMT level indication to ensure the WMT filling is secured prior to exceeding 85%. (IR 2-96-167)

4.9.3.10 WHEN discharge of LHST is completed, THEN **stop** the pump and **perform** the following alignments:

a. IF tank contents were routed through the WMT demineralizer, THEN **perform** the following:
IF NOT, THEN **Proceed To** Step 4.9.3.11.

- **Close** LAUNDRY & HOT SHOWER TANK TO WMT DEMIN, Q1G21V091A (1-LWP-V-7452A).
- **Close** WMT DEMIN DISCH TO #2 WMT, Q1G21V093B (1-LWP-V-7438B).
- **Close** WMT DEMIN OUTLET, Q1G21V094 (1-LWP-V-7434).

b. **Proceed To** Step 4.9.3.13.

4.9.3.11 **Close** WMT DEMIN DISCH TO #1 WMT, Q1G21V093A (1-LWP-V-7438A).

4.9.3.12 **Close** WMT DEMIN DISCH TO #2 WMT, Q1G21V093B (1-LWP-V-7438B).

4.9.3.13 **Open** #2 WMT DEMIN BYP, Q1G21V125 (1-LWP-V-7428).

4.9.3.14 **Open** #1 WMT INLET ISO, Q1G21V090 (1-LWP-V-7413).

4.9.3.15 **Close** LHST PUMP DISCH STRAINER OUTLET ISO, N1G21V084 (1-LWP-V-7407).

4.9.4 LHST Strainer Isolation for Basket Cleaning or Replacement:

4.9.4.1 **Proceed To** Appendix 4.0.

4.10 **MANUALLY DRAINING REFUELING CAVITY TO CTMT SUMP:**

4.10.1 **Verify** the following valves CLOSED:

- FUEL TRANSFER CANAL DRN, N1G21V172
- REFUELING CANAL DRAIN, N1G21V021 (1-LWP-V-7129).

4.10.2 **Provide** for leakage collection and HP coverage, then **remove** blind flange on cavity drain valve.

4.10.3 **Attach** flange with nipple to drain line using existing gasket.

4.10.4 **Attach** drain hose to nipple and **route** to strainer/filter container or sock filter supplied by Health Physics Support.

NOTE: The hose needs to be placed in the drain trough close to the drain pipe to the CTMT sump to prevent potential contamination problems. The drain pipe is located at the area by "C" S/G.

4.10.5 **Attach** drain hose to strainer/filter container and **route** to drain (CTMT sump).

4.10.6 With Health Physics Support coverage, **throttle** open FUEL TRANSFER CANAL DRN, N1G21V172 to prevent strainer/filter container from overflowing.

NOTE: Ensure all loose particles are being removed by ensuring only clean water is flowing from strainer/filter to CTMT sump.

4.10.7 WHEN draining is completed, THEN **close** FUEL TRANSFER CANAL DRN, N1G21V172.

4.10.8 With HP coverage provided, **remove** drain flange and **reinstall** blind flange on drain line.

4.10.9 **Have** Health Physics Support store drain flange with strainer/ filter container.

NOTE: Tank levels shall be monitored periodically during processing, discharge or transfer of liquid waste. ALL tank levels should be monitored, including non- source and non- destination tanks. CR# 2010102358

4.11 **ALTERNATE PROCESSING OF THE FDT TO THE WHT.**

4.11.1 **Procure** a 6" S/S flange with a 6" long x 2" nipple

4.11.2 **Attach** a 10' x 2" drain hose to the nipple flange.

4.11.3 **Remove** the existing blind flange and **install** the above described drain flange downstream of the FDT DRAIN, Q1G21V130 (1-LWP-V-7414).

4.11.4 **Route** hose to floor drain.

4.11.5 **Align** the Waste Gas Processing Room pumps discharge to the alternate tank (WHT) per FNP-1-SOP-50.2, LIQUID WASTE PROCESSING SYSTEM SUMP PUMP SYSTEM OPERATION.

4.11.6 **Notify** HP of the intent to drain the FDT to the floor drain system.

NOTE: Monitor the WHT level and sump operation to ensure satisfactory results.

4.11.7 **Open** or **throttle** open FDT DRAIN, Q1G21V130 (1-LWP-V-7414) and **drain** the FDT as desired.

4.11.8 WHEN the desired level in the FDT OR WHT is reached, THEN **close** FDT DRAIN, Q1G21V130 (1-LWP-V-7414).

4.11.9 WHEN the normal method of processing the FDT is available, THEN **realign** the Waste Gas Processing Room sump pump discharge to the normal tank (FDT) per FNP-1-SOP-50.2, LIQUID WASTE PROCESSING SYSTEM SUMP PUMP SYSTEM OPERATION.

4.11.10 **Remove** temporary drain flange and **replace** blind flange.

4.11.11 Blue **tag** and **return** the drain flange and hose to the SFP Storage Room.

NOTE: Tank levels shall be monitored periodically during processing, discharge or transfer of liquid waste. ALL tank levels should be monitored, including non- source and non- destination tanks. CR# 2010102358

4.12 **DRAINING THE CASK WASH AREA TO THE FDT.**

4.12.1 **Verify** sufficient capacity in the FDT and the System Operator is aware of the evolution. (CASK wash area, 31,000 gallon capacity)

4.12.2 **Verify** any additional draining evolutions planned concurrently with draining the Cask Wash area have been evaluated to ensure the floor drain system will not be overloaded.

NOTES:

- The CASK WASH ROOM DRAIN TO FDT ISO N1G21V927 is a 6 inch valve. Depending on circumstances significant opening of this valve can overload the floor drains and cause them to back up onto the floor potentially spreading contamination.
- The CASK WASH ROOM DRAIN TO FDT ISO N1G21V927 is located in the 121' batching area approximately 15 feet above floor level and will require a ladder or scaffolding for access.
- It is desirable to have an additional individual monitor the 100' elevation floor drains adjacent to the boric acid pumps while establishing the draining rate.

4.12.3 Slowly **open** CASK WASH ROOM DRAIN TO FDT ISO N1G21V927 in approximately ¼ turn increments.

4.12.4 **Allow** sufficient time to ensure drain rate equilibrium is obtained while monitoring the 121' elevation floor drain at the batching funnel and the 100' elevation floor drains adjacent to the boric acid transfer pumps and in the hallway adjacent to the charging pump suction valves.

4.12.5 **Continue** slowly opening CASK WASH ROOM DRAIN TO FDT ISO N1G21V927 in approximately ¼ turn increments until an acceptable drain rate is obtained without backup through the floor drains.

4.12.6 WHEN the cask wash area draining is complete, THEN **close** CASK WASH ROOM DRAIN TO FDT ISO N1G21V927.

5.0 RECORDS

QA Record (X)	Non-QA Record (X)	Record Generated	Retention Time	R-Type
X		FNP-1-SOP-50.0	Life of plant	HH6.051

6.0 REFERENCES

6.1 Drawings P&ID-l75042 sheets l-4 - Waste Processing System

6.2 Westinghouse System Description SD-ALA-407

6.3 Westinghouse Technical Manual U-258243.

6.4 PCN B85-1-3124 Educting Diaphragm on WECT

6.5 Drawings B-175787 Liquid Waste Instrument Loop Diagrams.

6.6 PCN S90-1-6414 PORV N_2 and RCDT H_2/N_2 drawing revisions.

6.7 RER Number 03 306 (AI 2003203123)

APPENDIX 1

MEASUREMENT OF FLOOR DRAIN TANK PUMP RECIRC LINE FLOW

Performed by: _____ Date _____

Reviewed by: _____ Date _____

This appendix consists of 5 pages

APPENDIX 1

MEASUREMENT OF FLOOR DRAIN TANK
PUMP RECIRC LINE FLOW

1.0 Verify the following (OR 1-98-498):

____ • The version of this procedure has been verified to be the current version. (OR 1-98-498)

____ • This procedure has been verified to be the correct procedure and unit for the task. (OR 1-98-498)

2.0 **INITIAL CONDITIONS**

____ 2.1 The FDT has been sampled and meets the requirements to be transferred to either WMT or the WHT.

____ 2.2 The floor drain tank has sufficient volume to permit transferring water to the #1 WMT, the #2 WMT and the WHT as required for the purpose of calculating recirculation flow rates.

NOTES:
- The optimum differential pressure for the FDT pump on recirculation is $\leq$ 111 PSID.
- The optimum differential pressure for the FDT pump in a discharge alignment is $\geq$ 88 PSID and $\leq$ 108 PSID.

3.0 **INSTRUCTIONS**

_____ 3.1 **Verify** FDT pump is secured.

_____ 3.2 **Unlock** and **close** FDT PUMP RECIRC N1G21V128 (Master Key).

_____ 3.3 **Open** FDT PUMP RECIRC N1G21V128 to approximately half open (this should be equal to ~5/16" rise in the valve stem.

_____ 3.4 **Record** FDT level _____

_____ 3.5 **Calculate** FDT pump suction pressure as follows:

$$\frac{\%\ \text{tank level}}{100} \times \frac{11.85\ \text{ft}}{2.31\ \text{ft/psig}} = \underline{\text{Suction pressure}}$$

$$\frac{\quad}{100} \times \frac{11.85\ \text{ft}}{2.31\ \text{ft/psig}} = _____$$

_____ 3.6 **Verify** the FDT pump started and **record** the following:

- FDT pump discharge pressure(PI-1090)_____

_____ 3.7 Using the discharge pressure recorded above and the suction pressure calculated in Step 3.5, **determine** FDT pump differential pressure.

$$\underline{\quad\quad\quad\quad} - \underline{\quad\quad\quad\quad} = \underline{\quad\quad\quad\quad\quad\quad}$$
$$\text{(Discharge pressure)} \quad \text{(Suction pressure)} \quad \text{(Pump differential pressure)}$$

_____ 3.8 **Adjust** FDT PUMP RECIRC N1G21V128 as necessary to obtain a pump differential pressure $\leq$ 111 PSID.

_____ 3.9 Using the guidance contained in Section 4.5.2, **align** the FDT to discharge to the #2 WMT for the purpose of collecting pump differential pressure.

_____ 3.10 **Record** FDT level _____

_____ 3.11 **Calculate** FDT pump suction pressure as follows:

$$\frac{\%\ \text{tank level}}{100} \times \frac{11.85\ \text{ft}}{2.31\ \text{ft/psig}} = \underline{\text{Suction pressure}}$$

$$\frac{\quad}{100} \times \frac{11.85\ \text{ft}}{2.31\ \text{ft/psig}} = _____$$

_____ 3.12 **Verify** the FDT pump started and **record** the following:

FDT pump discharge pressure(PI-1090)_____

_____ 3.13 Using the discharge pressure recorded above and the suction pressure calculated in Step 3.11, **determine** FDT pump differential pressure.

$$\underline{\quad\quad\quad\quad} - \underline{\quad\quad\quad\quad} = \underline{\quad\quad\quad\quad\quad\quad}$$
$$\text{(Discharge pressure)} \quad \text{(Suction pressure)} \quad \text{(Pump differential pressure)}$$

_____ 3.14 IF necessary, THEN **adjust** FDT PUMP RECIRC N1G21V128 to obtain a pump differential pressure > 88 PSID but < 108 PSID.

_____ 3.15 After the data has been collected, **secure** per Section 4.5.2.8.

_____ 3.16 Using the guidance contained in Section 4.5.3, **align** the FDT to discharge to the #1 WMT for the purpose of collecting pump differential pressure.

_____ 3.17 **Record** FDT level _____

_____ 3.18 **Calculate** FDT pump suction pressure as follows:

$$\frac{\%\ \text{tank level}}{100} \times \frac{11.85\ \text{ft}}{2.31\ \text{ft/psig}} = \underline{\text{Suction pressure}}$$

$$\frac{\quad}{100} \times \frac{11.85\ \text{ft}}{2.31\ \text{ft/psig}} = _____$$

_____ 3.19 **Verify** the FDT pump started and **record** the following:

FDT pump discharge pressure(PI-1090)_____

_____ 3.20 Using the discharge pressure recorded above and the suction pressure calculated in Step 3.18, **determine** FDT pump differential pressure.

$$\underline{\qquad\qquad} - \underline{\qquad\qquad} = \underline{\qquad\qquad}$$
(Discharge pressure) (Suction pressure) (Pump differential pressure)

_____ 3.21 IF necessary, THEN **adjust** FDT PUMP RECIRC N1G21V128 to obtain a pump differential pressure > 88 PSID but < 108 PSID.

_____ 3.22 After the data has been collected, **secure** per Section 4.5.3.11 through 4.5.3.16.

_____ 3.23 Using the guidance contained in Section 4.5.4, **align** the FDT to discharge to the WHT for the purpose of collecting pump differential pressure.

_____ 3.24 **Record** FDT level _____

_____ 3.25 **Calculate** FDT pump suction pressure as follows:

$$\frac{\%\ \text{tank level}}{100} \times \frac{11.85\ \text{ft}}{2.31\ \text{ft/psig}} = \underline{\text{Suction pressure}}$$

$$\frac{\qquad}{100} \times \frac{11.85\ \text{ft}}{2.31\ \text{ft/psig}} = \underline{\qquad\qquad}$$

_____ 3.26 **Verify** the FDT pump started and **record** the following:

FDT pump discharge pressure(PI-1090)_____

_____ 3.27 Using the discharge pressure recorded above and the suction pressure calculated in Step 3.25, **determine** FDT pump differential pressure.

$$\underline{\qquad\qquad} - \underline{\qquad\qquad} = \underline{\qquad\qquad}$$
(Discharge pressure) (Suction pressure) (Pump differential pressure)

_____ 3.28 IF necessary, THEN **adjust** FDT PUMP RECIRC N1G21V128 to obtain a pump differential pressure > 88 PSID but < 108 PSID.

_____ 3.29 After the data has been collected, **secure** per Section 4.5.4.5.

_____ 3.30 IF FDT PUMP RECIRC N1G21V128 was adjusted in steps 3.14, 3.21 OR 3.28, THEN **perform** the following, otherwise **Proceed To** Step 3.31:

_____ 3.30.1 **Record** FDT level _____

_____ 3.30.2 **Calculate** FDT pump suction pressure as follows:

$$\frac{\%\ \text{tank level}}{100} \times \frac{11.85\ \text{ft}}{2.31\ \text{ft/psig}} = \underline{\text{Suction pressure}}$$

$$\frac{\quad}{100} \times \frac{11.85\ \text{ft}}{2.31\ \text{ft/psig}} = _____$$

_____ 3.30.3 **Verify** the FDT pump started and **record** the following:

FDT pump discharge pressure(PI-1090)_____

_____ 3.30.4 Using the discharge pressure recorded above and the suction pressure calculated in Step 3.30.2, **determine** FDT pump differential pressure.

$$\underline{\qquad\qquad} - \underline{\qquad\qquad} = \underline{\qquad\qquad}$$
$$(\text{Discharge pressure}) \quad (\text{Suction pressure}) \quad (\text{Pump differential pressure})$$

_____ 3.30.5 **Verify** pump differential pressure $\leq$ 111 PSID.

_____ 3.31 **Install** locking device on FDT PUMP RECIRC N1G21V128.

APPENDIX 2

FLOOR DRAIN TANK FILTER ISOLATION

Performed by: _____ Date _____

Reviewed by: _____ Date _____

This appendix consists of 3 pages

APPENDIX 2

FLOOR DRAIN TANK FILTER ISOLATION

NOTES:
- This Appendix is only good for filter replacement on the shift it was performed.
- Each Step must be signed off immediately after completion of that step.

1.0 **PURPOSE:**

1.1 To provide guidance for isolating the Floor Drain Tank Filter for filter element replacement.

2.0 Verify the following (OR 1-98-498):

____ 2.1 The version of this procedure has been verified to be the current version. (OR 1-98-498)

____ 2.2 This procedure has been verified to be the correct procedure and unit for the task. (OR 1-98-498)

3.0 **INITIAL CONDITIONS:**

____ 3.1 **Perform** this appendix when notified that Maintenance is ready to change the filter. This will prevent the filter from drying out.

4.0 **PRECAUTION AND LIMITATIONS:**

4.1 This Appendix is only good for filter replacement on the shift it was performed.

5.0 **INSTRUCTIONS:**

_____ 5.1 **Record** the work order number associated with the current filter replacement.

WO #_____

5.2 **Isolate** Floor Drain Tank Filter as follows:

_____ 5.2.1 **Verify** closed FDT FILTER OUTLET, Q1G21V189. (139' Floor Drain Tank Filter room)

_____ 5.2.2 **Close** FDT FILTER INLET, Q1G21V120. (139' Floor Drain Tank Filter room)

_____ 5.2.3 **Verify** closed FDT DISCH TO WHT, Q1G21V123. (139' Floor Drain Tank Filter room)

_____ 5.2.4 **Close** FDT DISCH TO WASTE EVAP, Q1G21V267. (139' Floor Drain Tank Filter room)

_____ 5.2.5 **Open** FDT FILTER DRN, Q1G21V121A. (139' Floor Drain Tank Filter room)

_____ 5.2.6 **Open** FDT FILTER DRN, Q1G21V121B. (139' Floor Drain Tank Filter room)

_____ 5.2.7 **Open** FDT FILTER VENT, Q1G21V122. (139' Floor Drain Tank Filter room)

_____ 5.2.8 IF maintenance is (will be) delayed and work has not (will not be) started on the current shift, THEN **restore** the lineup to an in service configuration starting at Step 5.3.1, OR **have** the system configuration documented with a Tagout.

_____ 5.2.9 **Notify** SS that FDT filter has been replaced with new o-ring and lid
MAINT torqued to 100 in lb.

NOTE:	IF the FDT filter was tagged in Step 5.2.8 THEN the rest of this appendix is N/A.

5.3 WHEN maintenance has completed the filter replacement, THEN **return** the Floor Drain Tank Filter to service as follows:

_____ 5.3.1 **Close** FDT FILTER VENT, Q1G21V122.
(139' Floor Drain Tank Filter room)

_____ 5.3.2 **Close** FDT FILTER DRN, Q1G21V121B.
(139' Floor Drain Tank Filter room)

_____ 5.3.3 **Close** FDT FILTER DRN, Q1G21V121A.
(139' Floor Drain Tank Filter room)

_____ 5.3.4 **Open** FDT DISCH TO WASTE EVAP, Q1G21V267.
(139' Floor Drain Tank Filter room)

_____ 5.3.5 **Verify** closed FDT DISCH TO WHT, Q1G21V123.
(139' Floor Drain Tank Filter room)

_____ 5.3.6 **Open** FDT FILTER INLET, Q1G21V120.
(139' Floor Drain Tank Filter room)

_____ 5.3.7 **Verify** closed FDT FILTER OUTLET, Q1G21V189.
(139' Floor Drain Tank Filter room)

APPENDIX 3

FLOOR DRAIN TANK STRAINER ISOLATION

Performed by: _____ Date _____

Reviewed by: _____ Date _____

This appendix consists of 2 pages

APPENDIX 3

FLOOR DRAIN TANK STRAINER ISOLATION

1.0 **PURPOSE:**

1.1 To provide guidance for Floor Drain Tank Strainer basket cleaning or replacement.

2.0 **Verify** the following (OR 1-98-498):

____ 2.1 The version of this procedure is the current version.

____ 2.2 This procedure is the correct unit for the task.

3.0 **INITIAL CONDITIONS:**

____ 3.1 Floor Drain Tank Pump is tagged out.

4.0 **INSTRUCTIONS:**

____ 4.1 **Verify** Floor Drain Tank Pump has been tagged out with the following minimum electrical isolation:

- Pump hand switch N1G21P007-N LWPP H/S tagged in the pull-to-lock position.
- Motor 600V supply breaker FE-C5 open and tagged.

____ 4.2 **Verify** closed FDT STRAINER DISCH, N1G21V118. (83' FDT pump room)

____ 4.3 **Close** FDT PUMP SUCT, Q1G21V131. (83' FDT pump room)

____ 4.4 **Open** FDT STRAINER DRN, Q1G21V268. (83' FDT pump room)

____ 4.5 **Open** FDT STRAINER VENT, Q1G21V132. (83' FDT pump room)

4.6 WHEN the strainer has been drained, THEN **perform** the following:

____ 4.6.1 Slowly **loosen** and **remove** the four, ½" nuts holding the strainer cover in place.

____ 4.6.2 **Remove** strainer cover.

____ 4.6.3 **Remove** and **clean** the strainer basket.

____ 4.6.4 **Re-install** the strainer basket.

____ 4.6.5 **Inspect** strainer gasket for damage.

NOTE:	For a new strainer gasket use Red Rubber Gasket Material 1/8" Stock # 0000000014426.

____ 4.6.6 IF required, THEN **have** maintenance cut a new strainer gasket.

____ 4.6.7 **Re-install** strainer gasket and cover.

____ 4.6.8 **Replace** the four ½" nuts and tighten.

____ 4.7 **Close** FDT STRAINER VENT, Q1G21V132.

____ 4.8 **Close** FDT STRAINER DRN, Q1G21V268.

____ 4.9 **Verify** closed FDT STRAINER DISCH, N1G21V118.

____ 4.10 **Open** FDT PUMP SUCT, Q1G21V131.

____ 4.11 **Notify** SSS that strainer cleaning is complete, in order to have the removal Section of the FDT pump tagout prepared.

5.0 **REFERENCES:**

5.1 Drawing D175042/4

5.2 Drawing U-183750

5.3 List of Materials U-183751

APPENDIX 4

LAUNDRY AND HOT SHOWER
DRAIN TANK STRAINER ISOLATION

Performed by: _____ Date _____

Reviewed by: _____ Date _____

This appendix consists of 2 pages

APPENDIX 4

LAUNDRY AND HOT SHOWER DRAIN TANK STRAINER ISOLATION

1.0 **PURPOSE:**

1.1 To provide guidance for Laundry and Hot Shower Tank, Strainer basket cleaning or replacement.

2.0 **Verify** the following (OR 1-98-498):

____ 2.1 The version of this procedure is the current version.

____ 2.2 This procedure is the correct unit for the task.

3.0 **INITIAL CONDITIONS:**

____ 3.1 Laundry and Hot Shower Tank Pump is tagged out.

4.0 **INSTRUCTIONS:**

____ 4.1 **Verify** Laundry and Hot Shower Tank Pump has been tagged out with the following minimum isolation:

- Pump hand switch N1G21P004-LWPP H/S tagged in the pull-to-lock position.
- Motor 600V supply breaker FE-D2 open and tagged.
- LHST PUMP SUCT ISO, Q1G21V247 closed and tagged.

____ 4.2 **Verify** closed LHST PUMP DISCH STRAINER OUTLET ISO, N1G21V084. (100’ Chem Drain Tank room)

____ 4.3 **Open** LHST PUMP DISCH STRAINER DRAIN, Q1G21V265. (100’ Chem Drain Tank room)

____ 4.4 **Open** LHST PUMP DISCH STRAINER VENT, Q1G21V250. (100’ Chem Drain Tank room)

4.5 WHEN the strainer has been drained, THEN **perform** the following:

____ 4.5.1 Slowly **loosen** and **remove** the four, ½" nuts holding the strainer cover in place.

____ 4.5.2 **Remove** strainer cover.

____ 4.5.3 **Remove** and **clean** the strainer basket.

____ 4.5.4 **Re-install** the strainer basket.

____ 4.5.5 **Inspect** strainer gasket for damage.

NOTE:	For a new strainer gasket use Red Rubber Gasket Material 1/8" Stock # 014426.

____ 4.5.6 IF required, THEN **have** maintenance cut a new strainer gasket.

____ 4.5.7 **Re-install** strainer gasket and cover.

____ 4.5.8 **Replace** the four ½" nuts and tighten.

____ 4.6 **Close** LHST PUMP DISCH STRAINER VENT, Q1G21V250.

____ 4.7 **Close** LHST PUMP DISCH STRAINER DRAIN, Q1G21V265

____ 4.8 **Verify** closed LHST PUMP DISCH STRAINER OUTLET ISO, N1G21V084.

____ 4.9 **Notify** SSS that strainer cleaning is complete, in order to have the removal Section of the FDT pump tagout prepared.

5.0 **REFERENCES:**

5.1 Drawing D175042/4

5.2 Drawing D-175354

5.3 Drawing U-183748

5.4 List of Materials U-183749

FARLEY NUCLEAR PLANT

UNIT 1

APPENDIX 5

PROCESSING FDT USING TEMPORARY DEMIN LINER

Completed By_____ Date_____

Reviewed By_____ Date_____

This appendix consists of 6 pages.

PROCESSING FDT USING
TEMPORARY DEMIN LINER

1.0 PURPOSE

The purpose of this procedure Appendix is to allow processing of the FDT using a temporary demin liner discharging to the FDT or WHT.

2.0 Verify the following (OR 1-98-498):

____ 2.1 The version of this procedure is the current version.

____ 2.2 This procedure is the correct unit for the task.

3.0 PRECAUTIONS AND LIMITATIONS

3.1 WHEN processed fluid is being routed to the FDT or WHT, THEN the appropriate tank level(s) should be monitored closely.

3.2 To extend the life of resin, temporary demineralizers should be isolated with water maintained in them when not in use.

3.3 IF any fire doors will be propped open due to hoses, THEN **contact** the Fire Protection Administrator to implement the appropriate compensatory measures.

4.0 INITIAL CONDITIONS

____ 4.1 A temporary liner with resin is available to process the FDT per Figure 1.

____ 4.2 **Arrange** with ENV to sample first pass of resin effluent, and **sample** the FDT to determine its ultimate destination (either FDT or WHT).

____ 4.3 **Verify** that the liner is in place in an area that does not interfere with other work activities; **have** liner moved as necessary.

____ 4.4 IF effluent is processed to the WHT, THEN adequate space is available to receive the volume of water processed.

____ 4.5 **Set** up an empty, clean container to contain the first pass of resin effluent.

5.0 **INSTRUCTIONS**

____ 5.1 **Notify** the Radside SO that a large amount of water will be transferred and additional level monitoring of the FDT or WHT will be necessary.

____ 5.2 **Close** FDT FILTER INLET PI-1078 ROOT, Q1G21V119A (1-LWP-V-7422A).

____ 5.3 **Have** I&C remove flange to FDT FLTR INLET PI, N1G21PI1078.
I&C

____ 5.4 **Have** I&C install flange with elbowed Chicago Fitting to flange in Step 5.3.
I&C

5.5 **Commence** processing the first pass of resin effluent by performing the following:

____ 5.5.1 **Verify** closed FDT FILTER INLET, Q1G21V120 (1-LWP-V-7423).

____ 5.5.2 **Verify** closed #1 WMT DISCH TO FDT, Q1G21V115 (1-LWP-V-7454)

____ 5.5.3 **Verify** closed #2 WMT DISCH TO FDT, Q1G21V266 (1-LWP-V-7455)

____ 5.5.4 **Verify** closed FDT STRAINER DISCH, N1G21V118 (1-LWP-V-7421).

____ 5.5.5 **Attach** ≈ 200' of red rubber hose tested to 150 # with banded Chicago fittings to the flange installed in Step 5.4.

____ 5.5.6 **Route** and **attach** hose to portable demineralizer.

____ 5.5.7 **Route** discharge of portable demineralizer to empty clean container.

____ 5.5.8 **Verify** open FDT FILTER INLET PI-1078 ROOT, Q1G21V119A (1-LWP-V-7422A).

____ 5.5.9 **Verify** open portable demineralizer inlet valve.

____ 5.5.10 **Verify** open portable demineralizer outlet valve.

____ 5.5.11 **Start** FDT PUMP, N1G21P007.

____ 5.5.12 **Throttle** open FDT STRAINER DISCH, N1G21V118 (1-LWP-V-7421) to obtain desired flow rate through the portable demineralizer.

____ 5.6 **Sample** the first pass of resin effluent.
ENV

5.7 **Secure** the effluent flow by performing the following:

____ 5.7.1 **Stop** FDT PUMP, N1G21P007.

____ 5.7.2 **Close** the portable demineralizer inlet valve.

____ 5.7.3 **Close** the portable demineralizer outlet valve.

5.8 **Determine** discharge path for processed effluent as follows:

____ 5.8.1 **Check** sample for visible chromates. IF visible chromates are present,
ENV THEN **recommend** replacement of the portable demineralizer resin, and repeat of steps 5.5 through 5.7.

Visible chromates present (circle one) YES / NO

____ 5.8.2 Based on sample activity level and chromate concentration results
ENV above, **circle** below the tank to receive the processed effluent. Signing for this Step grants ENV permission to discharge portable demineralizer effluent to the tank designated below.

FDT / WHT

5.9 Processing to the WHT or FDT.

CAUTION:	Ensure the hose is adequately secured to prevent hose from becoming dislodged from the appropriate drain.

____ 5.9.1 **Route** outlet hose from temporary demineralizer to the drain system for the tank designated in Step 5.8.2. (i.e. floor drain for FDT or equipment drain for WHT)

____ 5.9.2 **Open** portable demineralizer inlet valve.

____ 5.9.3 **Open** portable demineralizer outlet valve.

____ 5.9.4 **Start** FDT PUMP, N1G21P007 to initiate continuous processing of the FDT.

NOTE: To monitor demineralizer effluent, place a white sheet of paper behind the effluent path for comparison to verify water is clear with no yellow tint.

____ 5.9.5 **Monitor** effluent frequently for CCW and **secure** if yellow tint detected.

____ 5.9.6 WHEN processing is complete, THEN **stop** FDT PUMP, N1G21P007.

____ 5.9.7 **Close** the portable demineralizer inlet valve.

____ 5.9.8 **Close** the portable demineralizer outlet valve.

5.10 Restoration of process flowpath.

____ 5.10.1 **Close** FDT FILTER INLET PI-1078 ROOT. Q1G21V119A (1-LWP-V-7422A).

CAUTION: When disconnecting the 200' hose it could contain 8 – 10 gallons of water. Have a suitable container available to drain the contents of the hose. Have the drained water tested to ensure it contains no chromates prior to disposal.

____ 5.10.2 **Disconnect** the ≈ 200' hose from the installed flange and the portable demineralizer.

____ I&C 5.10.3 **Have** I&C remove flange with elbowed Chicago Fitting installed in Step 5.4.

____ I&C 5.10.4 **Have** I&C reinstall flange to FDT FLTR INLET PI, N1G21PI1078.

__/__ CV 5.10.5 **Open** FDT FILTER INLET PI-1078 ROOT. Q1G21V119A (1-LWP-V-7422A).

__/__ CV 5.10.6 **Open** FDT FILTER INLET, Q1G21V120 (1-LWP-V-7423).

__/__ CV 5.10.7 **Close** FDT STRAINER DISCH, N1G21V118 (1-LWP-V-7421).

5.10.8 Independently **verify** the following:

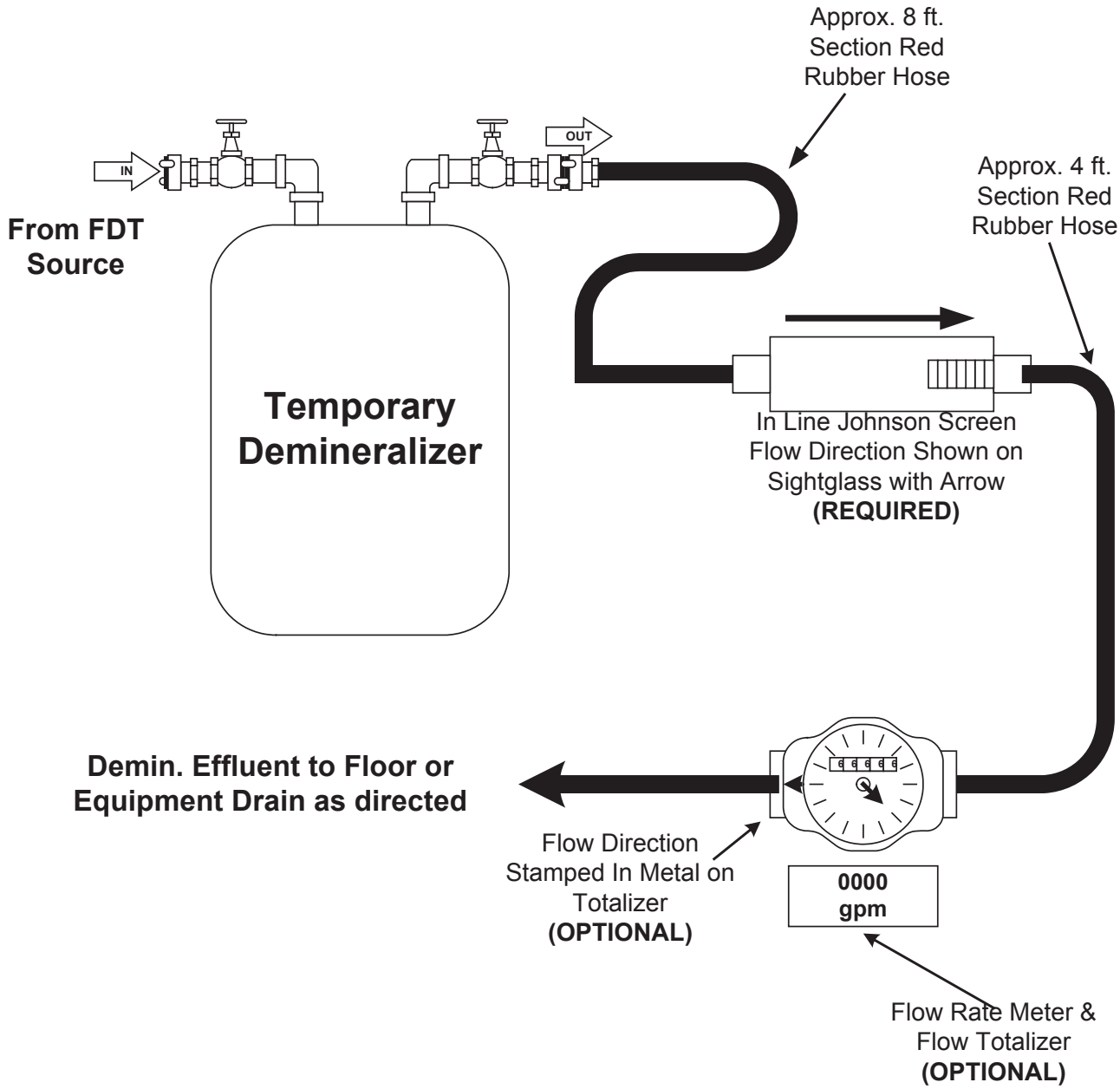
_____ 5.10.8.1 FDT FILTER INLET PI-1078 ROOT, Q1G21V119A open.

_____ 5.10.8.2 FDT FILTER INLET, Q1G21V120 open.

_____ 5.10.8.3 FDT STRAINER DISCH, N1G21V118 closed.

_____ 5.11 **Store** the hoses and elbowed flange in the appropriate location.

FIGURE 1



NOTE:
The in line Johnson Screen serves as an additional barrier to prevent putting resin into the floor drain system. The temporary demineralizer should not be placed in service without it. The flow indicator and totalizer are optional depending on the need to monitor flowrate and total gallons processed.

APPENDIX 6

Use of the RCDT LCV-1003 Controller (Q1G21LCV1003)

1. To select Automatic (AUTO) or Manual (MAN) mode of operation, **press** the **A/M** button on the keypad. The graphics display will have either A or M highlighted to show the selected mode.
2. In Manual, depressing Δ or ∇ controls the valve position. Valve position is monitored on the right hand bargraph display.
3. In Automatic, depressing Δ or ∇ controls the setpoint. The setpoint can be monitored on the left hand bargraph display.
4. To change the setpoint of LCV-1003 with the valve controller in Manual:
   a. **Select** the left-hand bargraph display by depressing **SEL** and observing the blue dot above the bargraph displays.
   b. **Depress** Δ or ∇ to control the setpoint. The bar graph will move up or down and the digital display will show the setpoint.

General Notes:

1. The new controller is a FOXBORO 760 series, microprocessor based, multi display system.
2. It has three "bargraph" LCD displays. From left they are:
   a. **Setpoint** - this shows the AUTO setpoint for RCDT level.
   b. **Variable** - this shows the actual RCDT level.
   c. **Demand** - this shows the demanded position of LCV-1003.
3. The digital display above the bar graphs gives a readout for whichever bar graph is currently selected.
4. The keypad on the lower Section of the controller has eight buttons:

Δ	-	to increase the selected variable.
∇	-	to decrease the selected variable.
W/P	-	not used
R/L	-	not used
A/M	-	selects Auto or Manual
SEL	-	selects the function for the up/down buttons and the bargraph display which will have the digital display. Also used by I&C.
TAG	-	used by I&C.41

FARLEY NUCLEAR PLANT

UNIT 1

APPENDIX 7

INSTALLATION OF TEMPORARY LEVEL INDICATION FOR THE FLOOR DRAIN TANK

Completed By_____ Date _____

Reviewed By_____ Date _____

This appendix consists of 2 pages.

1.0 PURPOSE

Provide guidance for the installation of a level hose to provide temporary level indication when the installed level transmitter is inoperable or for any other operational necessity.

2.0 INITIAL CONDITIONS

2.1 **Check** the appendix of this procedure for the following:

_____ 2.1.1 The version of this procedure appendix has been verified to be the current version. (OR 1-98-498)

_____ 2.1.2 This procedure appendix has been verified to be the correct unit for the task. (OR 1-98-498)

3.0 PRECAUTIONS AND LIMITATIONS

3.1 Do NOT leave FDT DRN, Q1G21V130 open unattended. Intent is to valve in level hose temporarily to check level, and then isolate hose before leaving area.

4.0 INSTRUCTIONS:

NOTE:	Only the appropriate section of this appendix needs to be completed. The other section may be signed off as N/A if not required to be performed.

4.1 LEVEL HOSE INSTALLATION:

_____ 4.1.1 **Verify** closed FDT DRN, Q1G21V130.

_____ 4.1.2 **Remove** the blind flange from the floor drain tank drain line.

_____ 4.1.3 **Connect** a 2” reducer sized for the diameter tubing/tygon to be used for the level hose.

_____ 4.1.4 **Connect** and route level hose.

NOTE:	Do NOT leave FDT DRN, Q1G21V130 open unattended.

_____ 4.1.5 **Open** FDT DRN, Q1G21V130 as required to check level, THEN **close** Q1G21V130.

_____ 4.1.6 **Repeat** step 4.1.5 as needed to monitor FDT level.

4.2 LEVEL HOSE REMOVAL:

_____ 4.2.1 **Verify** closed FDT DRN, Q1G21V130.

NOTE:	**Take** appropriate measures to contain any leakage from the level hose and drain line when performing the following steps.

_____ 4.2.2 Carefully **disconnect** level hose and drain to an appropriate container.

_____ 4.2.3 **Remove** the 2" reducer from the floor drain tank drain line.

_____ 4.2.4 **Reinstall** the blind flange to floor drain tank drain line.

APPENDIX 8

WASTE EVAPORATOR FEED FILTER ISOLATION

Performed by: _____ Date _____

Reviewed by: _____ Date _____

This appendix consists of 3 pages

APPENDIX 2

WASTE EVAPORATOR FEED FILTER ISOLATION

NOTES:
- This Appendix is only good for filter replacement on the shift it was performed.
- Each Step must be signed off immediately after completion of that step.

1.0 **PURPOSE:**

1.1 To provide guidance for isolating the Waste Evaporator Feed Filter for filter element replacement.

2.0 Verify the following (OR 1-98-498):

____ 2.1 The version of this procedure has been verified to be the current version. (OR 1-98-498)

____ 2.2 This procedure has been verified to be the correct procedure and unit for the task. (OR 1-98-498)

3.0 **INITIAL CONDITIONS:**

____ 3.1 **Perform** this appendix when notified that Maintenance is ready to change the filter. This will prevent the filter from drying out.

4.0 **PRECAUTION AND LIMITATIONS:**

4.1 This Appendix is only good for filter replacement on the shift it was performed.

5.0 **INSTRUCTIONS:**

_____ 5.1 **Record** the work order number associated with the current filter replacement.

WO #_____

5.2 **Isolate** Waste Evaporator Feed Filter as follows:

_____ 5.2.1 **Verify closed** WEFF INLET, Q1G21V020.
(83' WEF Pump room)

_____ 5.2.2 **Verify closed** WEFP DISCH TO FDT ISO, Q1G21V027.
(83' WEF Pump room)

_____ 5.2.3 **Close** WASTE EVAP FEED FILTER OUTLET, Q1G21V019.
(139' Waste Evap Feed Filter room)

_____ 5.2.4 O**pen** WASTE EVAP FEED FILTER DRN Q1G21V023A.
(139' Waste Evap Feed Filter room)

_____ 5.2.6 O**pen** WASTE EVAP FEED FILTER DRN Q1G21V023B.
(139' Waste Evap Feed Filter room)

_____ 5.2.7 O**pen** WASTE EVAP FEED FILTER vent Q1G21V022.
(139' Waste Evap Feed Filter room)

_____ 5.2.8 IF maintenance is (will be) delayed and work has not (will not be) started on the current shift, THEN **restore** the lineup to an in service configuration starting at Step 5.3.1, OR **have** the system configuration documented with a Tagout.

_____ 5.2.9 **Notify** SS that WEF filter has been replaced with new o-ring and lid
MAINT torqued to 100 in lb.

NOTE:	IF the WEF filter was tagged in Step 5.2.8 THEN the rest of this appendix is N/A.

5.3 WHEN maintenance has completed the filter replacement, THEN return the Waste Evaporator Feed Filter to service as follows:

_____ 5.3.1 **Close** WASTE EVAP FEED FILTER vent Q1G21V022.
(139' Waste Evap Feed Filter room)

_____ 5.3.2 **Close** WASTE EVAP FEED FILTER DRN Q1G21V023B.
(139' Waste Evap Feed Filter room)

_____ 5.3.3 **Close** WASTE EVAP FEED FILTER DRN Q1G21V023A.
(139' Waste Evap Feed Filter room)

_____ 5.3.4 **Open** WASTE EVAP FEED FILTER OUTLET, Q1G21V019.
(139' Waste Evap Feed Filter room)

_____ 5.3.5 **Verify closed** WEFP DISCH TO FDT ISO, Q1G21V027.
(83' WEF Pump room)

_____ 5.3.6 **Verify closed** WEF FILTER INLET, Q1G21V020.
(83' WEF Pump room)

UNIT 2

FNP-2-SOP-50.0
October 31, 2011
Version 70.0

FARLEY NUCLEAR PLANT

SYSTEM OPERATING PROCEDURE

FNP-2-SOP-50.0

SAFETY RELATED

LIQUID WASTE PROCESSING SYSTEM

PROCEDURE LEVEL OF USE CLASSIFICATION PER NMP-AP-003	
CATEGORY	**SECTIONS**
Continuous:	**ALL**
Reference:	**NONE**
Information:	**NONE**

Approved:

David L. Reed (for)
Operations Manager

07/07/2014
Effective Date

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FARLEY NUCLEAR PLANT
UNIT 2
SYSTEM OPERATING PROCEDURE SOP-50.0

LIQUID WASTE PROCESSING SYSTEM

1.0 PURPOSE

This procedure provides the Initial Conditions, Precautions and Limitations, and Instructions for Operation of the Liquid Waste Processing System. Included are the following instructions.

4.1 Reactor Coolant Drain Tank (RCDT) Operation

- 4.1.1 RCDT system startup and recirculation
- 4.1.2 RCDT normal operation
- 4.1.3 Manual Pump Down of RCDT to RHT
- 4.1.4 RCDT Discharge to WHT
- 4.1.5 Draining refueling canal with the RCDT System to the RWST.
- 4.1.6 Filling the RCDT from the PRT
- 4.1.7 Draining Refueling Cavity Using the RCDT System and Pumping to the RHT or WHT
- 4.1.8 Processing Nozzle Dam Leakage to RHT.
- 4.1.9 Draining the RCS Loops for Maintenance Via the Reactor Coolant Drain System.
- 4.1.10 Establishing a Hydrogen Atmosphere in the RCDT.
- 4.1.11 Establishing a Nitrogen Atmosphere in the RCDT

4.2 Waste Holdup Tank (WHT) Operation

4.3 Waste Evaporator Condensate Tank (WECT) Operation

4.4 Chemical Drain Tank (CDT) Operation

4.5 Floor Drain Tank (FDT) System Operation

4.6 Waste Monitor Tank (WMT) #1 (2) Operation

4.7 Waste Monitor Tank (WMT) #1 (2) Recirculation through the Waste Monitor Tank Demineralizer.

4.8 Manually Draining Refueling Cavity to CTMT Sump

4.9 Alternate Processing of the FDT to the WHT

4.10 Draining the Cask Wash Area to the FDT

Appendix 1 Use of the RCDT LCV-1003 Controller

Appendix 2 Floor Drain Tank Filter Isolation for Filter Replacement.

Appendix 3 Floor Drain Tank Strainer Isolation for Basket Cleaning or Replacement.

Appendix 4 Processing FDT using Temporary Demin Line

Appendix 5 Installation of Temporary Level Indication For the Floor Drain Tank
Appendix 6 Waste Evaporator Feed Filter Isolation for Filter Replacement.

2.0 INITIAL CONDITIONS

2.1 The electrical distribution system is energized and aligned for normal operation per system check list FNP-2-SOP-36.0, PLANT ELECTRICAL DISTRIBUTION LINE-UP, with exceptions noted.

2.2 The compressed air system is in service and aligned for normal operation per FNP-2-SOP-31.0, COMPRESSED AIR SYSTEM.

2.3 The liquid waste processing system valves are aligned per system check list FNP-2-SOP-50.0A-D with exceptions noted.

2.4 Component cooling water system is aligned per FNP-2-SOP-23.0, COMPONENT COOLING WATER SYSTEM, to supply water to the waste evaporator condenser, distillate cooler, vent condenser and RCDT heat exchanger. This initial condition may be waived by the Shift Supervisor if not required to support the activity being performed.

2.5 A hydrogen blanket has been established in the RCDT and is being maintained at a pressure between 3 and 8 psig per section 4.1.10. This initial condition may be waived by the Shift Supervisor if not required to support the activity being performed.

2.6 Solid Waste Processing System aligned per FNP-2-SOP-49.1A and B, WASTE TRANSFER TO BULK SOLIDIFICATION & DEWATERING FACILITY.

2.7 The WHT to Recycle Evap. Spoolpiece and the R.E.C. Filter to Waste Evap. Condensate Tank Spoolpiece are both removed and blind flanges are installed.

3.0 PRECAUTIONS AND LIMITATIONS

3.1 Due to the presence of radioactive or potentially radioactive materials within the confines of the liquid waste processing system, constant vigilance must be exercised over system piping, valves, tanks, and other components whether in operation or shutdown. Pre-operational checks and normal routine operations and surveillance should include visual checks for system deterioration, component leakage, and correct system line-up which if not detected and corrected could subsequently result in the release of radioactive liquid to the immediate area, the environment, or other parts of this system.

3.2 Radiation monitor RE-18 must be operable and in service during liquid waste discharge to the river except as permitted by technical specifications.

3.3 IF RE-18 becomes inoperable while discharging liquid waste to the river, THEN the discharge must be stopped immediately.

3.4 The Shift Supervisor or Shift Support Supervisor shall be notified any time RE-18 is taken out of service or becomes inoperable.

3.5 A Radioactive Liquid Release Permit must be completed and approved prior to discharging radioactive liquid to the river.

3.6 Verify that tanks aligned to receive liquid waste discharge have sufficient capacity to receive the liquid.

3.7 ALL tank levels shall be monitored periodically during processing, discharge or transfer of liquid waste, including non-source and non-destination tank levels. For processing or transfers, the levels of the source tank and the destination tank should be determined. The approximate flow rate should be considered and used to determine an approximate completion time. Tank levels shall be checked prior to the estimated completion of the processing or transfer such that sufficient margin exists to prevent tank overflow. At no time should the High Level Alarm be relied upon for securing the processing or transfer of a tank. To preclude overflow, waste tanks should not be filled to greater than 85%.

3.8 A deficiency report should be written to replace liquid waste system filters when the ΔP increases to greater than 20 psid.

3.9 Caution should be exercised when pumping liquids to ascertain that affected pumps do not lose suction.

3.10 Once a WMT has been placed on recirculation for sampling purposes, prior to discharging to the environment, the tank shall remain in an isolated condition to prevent the introduction of any liquids which could alter the concentrations of the tank's contained volume.

3.11 Sample source tank for activity prior to transfer from Unit 2 to Unit 1. This sample may be waived by Chemistry based on source of water.

3.12 When filling the WMTs, estimate the time that the WMT tank will reach 80% level. The estimated time to reach 80% may be determined by timing the WMT level increase for at least 5% and extrapolating the time to reach 80%. WHEN the WMT reaches 80%, THEN continuously monitor the WMT level indication to ensure the WMT filling is secured prior to exceeding 85%. (IR 2-96-167)

3.13 If a level hose has been installed on the floor drain tank it may be valved in for periodic monitoring whenever needed. However it must be valved out when the observation or monitoring is complete.

3.14 Contact Health Physics prior to opening N2G21V021 Refueling Canal Drain. Opening this valve has the potential for increased dose rates in the RCDT pump area and 100' PPR in Aux Building. (AI2008207409)

4.0 INSTRUCTIONS

4.1 REACTOR COOLANT DRAIN TANK (RCDT) OPERATION

NOTE: Refer to Appendix 1 for operation of the RCDT level controller (LCV-1003) located on the Liquid Waste Processing Panel.

4.1.1 RCDT System Startup and Recirculation

NOTE: IF necessary to establish adequate recirc flow to keep an RCDT pump running, THEN RCDT RECIRC ORIFICE BYP VALVE N2G21HV7143 may be opened. This condition should be tracked using a caution tag or administrative tracking item to ensure that it is restored when recirc is no longer required.

4.1.1.1 RCDT system is aligned per system checklist FNP-2-SOP-50.0A.

4.1.1.2 **Verify** open the following valves:

- RCDT RECIRC ISO N2G21HV7144 (LWPP)
- RCDT OUTLET ISO N2G21HV7127 (LWPP)

4.1.1.3 **Verify** that RCDT LCV Q2G21LCV1003 (Q2G21V064) is in MANUAL and closed (LWPP)

NOTE: IF RCDT is being aligned for recirculation to fill the RCDT then steps 4.1.1.4 thru 4.1.1.6 may be NA'ed to allow gravity filling of the RCDT

4.1.1.4 RCDT level is greater than 20%.

4.1.1.5 **Start** an RCDT pump.

4.1.1.6 IF desired to adjust tank level while on recirc, THEN **adjust** RCDT LCV Q2G21LCV1003 (Q2G21V064) as required in manual or automatic to control RCDT level.

4.1.2 RCDT Normal Operation

NOTES:

- Venting of the RCDT should be performed as needed in accordance with FNP-2-SOP-51.0, WASTE GAS SYSTEM.
- RCDT pumps should automatically trip at 10% RCDT level.
- The RCDT should be pumped down periodically per sections 4.1.3 or 4.1.4 to maintain parameters within the following bands:

	MIN	MAX
RCDT Level	5%	75%
RCDT Pressure	3 psig	8 psig
RCDT Temp	N/A	170° F

4.1.2.1 **Place** both RCDT pumps in PULL-TO-LOCK.

4.1.2.2 **Verify** that RCDT LCV Q2G21LCV1003 (Q2G21V064) is in MANUAL and closed (LWPP)

4.1.2.3 **Take** RCDT LCV Q2G21LCV1003 selector switch on MCB to OPEN and then spring **return** to AUTO.

4.1.2.4 **Verify** RCDT PUMPS DISCH LINE ISO Q2G21HV7136 (Q2G21V0006) handswitch on MCB, OPEN and in AUTO.

4.1.2.5 WHEN necessary to lower tank level or pressure, THEN **perform** section 4.1.3 to pump to the RHT OR 4.1.4 to pump to the WHT.

NOTE: The following section may be utilized to lower RCDT pressure by lowering RCDT level.

4.1.3 Manual Pump Down of RCDT to RHT

4.1.3.1 **Verify** open the following valves:

- RCDT RECIRC ISO N2G21HV7144 (LWPP)
- RCDT OUTLET ISO N2G21HV7127 (LWPP)

4.1.3.2 IF required to maintain RCDT pressure by addition of hydrogen, THEN **perform** the following:

1. **Verify** pressure controller WASTE PROCESSING SYSTEM HYDROGEN BOTTLE DIS, Q2G21HV7155 (Q2G21V063) set to maintain 3 psi. (155' Plant Grounds)
2. **Open** H_2 bottle isolation.
3. **Open** H2 BOTTLE TO RCDT ISO, N2G21V340.
4. **Verify** open H2 SUPP TO RCDT, N2G21V284 (at H_2 Bottle) with the bottle regulator set for approximately 20 psi.

4.1.3.3 **Verify** that RCDT LCV Q2G21LCV1003 (Q2G21V064) is in MANUAL and closed (LWPP)

4.1.3.4 **Take** RCDT LCV Q2G21LCV1003 selector switch on MCB to OPEN and then spring **return** to AUTO.

4.1.3.5 **Open** RCDT PUMPS DISCH LINE ISO Q2G21HV7136.

4.1.3.6 **Place** RCDT LCV, Q2G21LCV1003 (Q2G21V064) in MANUAL and **open** 20-50%. (LWPP)

4.1.3.7 **Start** 2A(B) RCDT pump, and **verify** flow through FI 1008 (LWPP).

4.1.3.8 WHEN desired level is reached, THEN **perform** the following:

a. **Stop** 2A(B) RCDT pump.

b. **Close** RCDT LCV, Q2G21LCV1003 (Q2G21V064) (LWPP).

4.1.3.9 **Verify** RCDT pressure PI 1004 (LWPP) between 3 and 8 psi.

4.1.3.10 IF opened in step 4.1.3.2, THEN **perform** the following:

1. **Close** H_2 bottle isolation.
2. **Close** H2 BOTTLE TO RCDT ISO, N2G21V340.

4.1.3.11 **Restore** the RCDT to normal operation per section 4.1.2.

NOTE:
- The following section may be utilized to lower RCDT pressure by lowering RCDT level.
- IF no RCDT pumps are operable, THEN it is permissible to gravity drain to WHT.

4.1.4 RCDT Discharge to WHT

4.1.4.1 **Open** RCDT DISCH TO WHT, Q2G21V009 (2-LWP-V-7137).

4.1.4.2 **Close** RCDT PUMP DISCH TO RHT ISO, Q2E21V315 (2-CVC-V-8551).

4.1.4.3 **Verify** open the following valves:

- RCDT RECIRC ISO N2G21HV7144 (LWPP)
- RCDT OUTLET ISO N2G21HV7127 (LWPP)

4.1.4.4 IF required to maintain RCDT pressure by addition of hydrogen, THEN **perform** the following:

1. **Verify** pressure controller WASTE PROCESSING SYSTEM HYDROGEN BOTTLE DIS, Q2G21HV7155 (Q2G21V063) set to maintain 5 psi. (155' Plant Grounds)
2. **Open** H_2 bottle isolation.
3. **Open** H2 BOTTLE TO RCDT ISO, N2G21V340.
4. **Verify** open H2 SUPP TO RCDT, N2G21V284 (at H_2 Bottle) with regulator set for approximately 20 psi.

4.1.4.5 **Verify** that RCDT LCV Q2G21LCV1003 (Q2G21V064) is in manual and closed (LWPP)

4.1.4.6 **Take** RCDT LCV Q2G21LCV1003 (Q2G21V064) selector switch on MCB to OPEN and then spring **return** to AUTO.

4.1.4.7 **Open** RCDT PUMPS DISCH LINE ISO Q2G21HV7136.

4.1.4.8 **Place** RCDT LCV, Q2G21LCV1003 (Q2G21V064) in MANUAL and **open** 20-50%. (LWPP)

4.1.4.9 **Start** 2A(B) RCDT pump, and **verify** flow through FI 1008 (LWPP).

4.1.4.10 WHEN desired level is reached, THEN **perform** the following:

a. **Stop** 2A(B) RCDT pump.

b. **Close** RCDT LCV, Q2G21LCV1003 (Q2G21V064) (LWPP).

4.1.4.11 **Realign** valves as follows:

- **Open** RCDT PUMP DISCH TO RHT ISO, Q2E21V315 (2-CVC-V-8551).
- **Close** RCDT DISCH TO WHT Q2G21V009 (2-LWP-V-7137).

4.1.4.12 **Verify** RCDT pressure PI 1004 (LWPP) between 3 and 8 psi.

4.1.4.13 IF opened in step 4.1.4.4, THEN **perform** the following:

1. **Close** H_2 bottle isolation.
2. **Close** H2 BOTTLE TO RCDT ISO, N2G21V340.

4.1.4.14 **Restore** the RCDT to normal operation per section 4.1.2.

4.1.5 Draining refueling canal with the RCDT System to the RWST.

4.1.5.1 **Stop** all operating RCDT pumps.

4.1.5.2 **Close** RCDT OUTLET ISO N2G21HV7127 (N2G21V006).

4.1.5.3 **Close** RCDT RECIRC ISO N2G21HV7144 (N2G21V106).

4.1.5.4 **Verify** closed RCDT DISCH TO WHT Q2G21V009 (2-LWP-V-7137).

4.1.5.5 **Verify** closed RCDT PUMP DISCH TO RHT ISO, Q2E21V315 (2-CVC-V-8551).

4.1.5.6 **Verify** closed PRESSURIZER RELIEF TANK DRN N2B13HV8031.

4.1.5.7 **Verify** SFP purification loop is not in operation per FNP-2-SOP-54.0, SPENT FUEL PIT COOLING AND PURIFICATION SYSTEM.

4.1.5.8 IF RWST purification is in operation, THEN **perform** the following:

a. **Stop** the RWP pump.

b. **Close** RWP PUMP SUCTION FROM RWST ISO, Q2G31V010.

4.1.5.9 **Verify** the following open:

1. RWP PUMP DISCH ISO, N2G31V008 (2-SFP-V-8792)
2. SFP PURIF OUTLET TO RWST, N2G31V021B (2-SFP-V-8793B).

4.1.5.10 **Bypass** the SFP demineralizer by performing the following:

- **Close** SFP PURIF INLET ISO, N2G31V009 (2-SFP-V-8773).
- **Open** SFP DEMIN BYPASS, N2G31V012 (2-SFP-V-8774).
- **Close** SFP DEMIN INLET ISO, N2G31V003 (2-SFP-V-8776).

4.1.5.11 **Verify** RCDT PUMPS DISCH LINE ISO Q2G21HV7136 is open and the handswitch is in the AUTO position.

NOTES:
- The RWP pump is not required; however, experience has shown it greatly increases flow and it is normally desired to have running.
- Throttle SFP PURIF OUTLET TO RWST, N2G31V021B (2-SFP-V-8793B) as necessary to limit flow through SFP demineralizer to ≤ 100 GPM on FI-654.
- N2G21V021 should not be opened until Rx Cavity draining is in progress (AI2008207409)

4.1.5.12 **Open** REFUELING CANAL DRN, N2G21V021 (2-LWP-V-7129).

4.1.5.13 **Open** RCDT DISCH TO SFPCS RWPP SUCT, Q2G21V008 (2-LWP-V-7138).

4.1.5.14 **Open** RCDT LCV Q2G21LCV1003 (Q2G21V064).

NOTES:
- In the following step, it will be necessary to hold the handswitch in start for the RCDT pump until flow is established to permit the pump to remain running.
- An operator stationed at the refueling water purification pump should monitor discharge pressure of the pump. When RWST pump discharge pressure increases due to the start of the RCDT pump, the RWST purification pump may be started per step 4.1.5.16.

4.1.5.15 **Start** an RCDT pump.

CAUTION: The RWP pump does not have a low flow trip.

4.1.5.16 IF desired, THEN **start** the RWP pump.

CAUTION: RCDT pump discharge piping is protected from over pressurization by a relief valve at penetration 31 outside containment which discharges to the equipment drains. This relief valve can sustain seat leakage at pressures above 150 psig.

NOTE: Two RCDT pumps may be required to prevent the RWP pump from cavitating. IF a second RCDT pump is started THEN monitor RCDT pump discharge pressure to ensure the relief valve is not challenged (<150 psig).

4.1.5.17 IF necessary to prevent RWP pump cavitation THEN **start** the second RCDT pump.

4.1.5.18 WHEN the desired RWST level is reached, THEN **stop** the RWP pump, if running, and **shift** the RCDT discharge to one of the following:

4.1.5.18.1 Aligning discharge to the RHT by performing the following:

1. **Open** RCDT PUMP DISCH TO RHT ISO, Q2E21V315 (2-CVC-V-8551)
2. **Close** RCDT DISCH TO SFPCS RWPP SUCT, Q2G21V008 (2-LWP-V-7138)

4.1.5.18.2 Aligning discharge to the WHT by performing the following:

1. **Open** RCDT DISCH TO WHT Q2G21V009 (2-LWP-V-7137)
2. **Close** RCDT DISCH TO SFPCS RWPP SUCT, Q2G21V008 (2-LWP-V-7138)

4.1.5.19 WHEN draining is completed, THEN **stop** the RWP pump if running, and **stop** the RCDT pump. **Realign** valves as follows:

- **Close** REFUELING CANAL DRN, N2G21V021 (2-LWP-V-7129).
- **Verify** closed RCDT DISCH TO SFPCS RWPP SUCT, Q2G21V008 (2-LWP-V-7138).
- **Close** RWP PUMP DISCH ISO, N2G31V008 (2-SFP-V-8792).
- **Close** SFP PURIF OUTLET TO RWST, N2G31V021B (2-SFP-V-8793B).
- **Close** RCDT DISCH TO WHT Q2G21V009 (2-LWP-V-7137)
- **Verify** open RCDT PUMP DISCH TO RHT ISO, Q2E21V315 (2-CVC-V-8551).
- **Open** RCDT OUTLET ISO Q2G21HV7127 (Q2G21V006).
- **Open** RCDT RECIRC ISO Q2G21HV7144 (N2G21V106).
- **Close** RCDT LCV Q2G21LCV1003 (Q2G21V064) and **return** control to MANUAL.

4.1.5.20 **Restore** SFP demineralizer alignment by performing the following:

- **Open** SFP PURIF INLET ISO, N2G31V009 (2-SFP-V-8773).
- **Open** SFP DEMIN INLET ISO, N2G31V003 (2-SFP-V-8776).
- **Close** SFP DEMIN BYPASS, N2G31V012 (2-SFP-V-8774).

4.1.5.21 **Restore** the RCDT to normal operation per section 4.1.2.

NOTE: Leave vent path in operation for pressure increases due to level increases.

4.1.6 Filling the RCDT from the PRT

4.1.6.1 **Verify** RCDT aligned in recirculation per Section 4.1.

4.1.6.2 **Verify** sufficient water available in PRT.

4.1.6.3 **Open** PRT DRN ISO, N2B13HV8031 [MCB].

NOTE: Closing RCDT outlet iso N2G21HV7127 (N2G21V006) RCDT OUTLET ISO will cause rapid rise in RCDT Level.

4.1.6.4 IF required, THEN **close** RCDT OUTLET ISO, N2G21HV7127 (N2G21V006) [LWPP].

4.1.6.5 WHEN desired level reached in RCDT, THEN **verify** RCDT OUTLET ISO, N2G21HV7127 (N2G21V006) open.

4.1.6.6 **Close** PRT DRN ISO, N2B13HV8031 [MCB].

4.1.6.7 IF required, THEN **vent** the RCDT per FNP-1-SOP-51.0, WASTE GAS SYSTEM, section 4.9 or 4.17.

4.1.6.8 **Restore** alignment of RCDT for normal operation per step 4.1.2 of this procedure.

4.1.7 Draining Refueling Cavity Using the RCDT System and Pumping to the RHT or WHT

4.1.7.1 **Verify** an RHT in service per FNP-2-SOP-2.4, CVCS BORON RECYCLE SYSTEM.

4.1.7.2 **Stop** all operating RCDT pumps.

4.1.7.3 **Close** RCDT OUTLET ISO, N2G21HV7127 (N2G21V006) on LWPP.

4.1.7.4 **Close** RCDT RECIRC ISO, N2G21HV7144 (N2G21V106) on LWPP.

4.1.7.5 **Verify** RCDT PUMPS DISCH LINE ISO, Q2G21HV7136 is open and handswitch is in the AUTO position (MCB).

NOTE: N2G21V021 should not be opened until Rx Cavity draining is to commence. (AI2008207409)

4.1.7.6 **Open** REFUELING CANAL DRAIN, N2G21V021 (2-LWP-V-7129).

4.1.7.7 **Verify** closed RCDT DISCH TO SFPCS RWPP SUCT, Q2G21V008 (2-LWP-V-7138).

4.1.7.8 If discharge of the RCDT to the WHT is desired:

4.1.7.8.1 **Close** RCDT PUMP DISCH TO RHT ISO, Q2E21V315 (2-CVC-V-8551).

4.1.7.8.2 **Open** RCDT DISCH TO WHT Q2G21V009 (2-LWP-V-7137).

4.1.7.9 If discharge of the RCDT to the RHT is desired:

4.1.7.9.1 **Verify** closed RCDT DISCH TO WHT Q2G21V009 (2-LWP-V-7137).

4.1.7.9.2 **Verify** open RCDT PUMP DISCH TO RHT ISO, Q2E21V315 (2-CVC-V-8551).

4.1.7.9.3 **Monitor** RHT level and WHEN necessary, THEN **stop** RCDT pumps and **shift** RHT's per FNP-2-SOP-2.4.

4.1.7.10 **Open** RCDT LCV Q2G21LCV1003 (Q2G21V064).

CAUTIONS:
- Continuous monitoring of refueling cavity level is necessary to prevent cavitation of the RCDT pump(s).
- If a second RCDT pump is started, ensure that the flow rate remains at least 15 gpm higher than the flow obtained from a single pump to ensure miniflow protection is maintained. The flow rate will change as the cavity is lowered so the single pump reference will need to be obtained repeatedly.

4.1.7.11 **Start** a RCDT pump.

4.1.7.12 IF desired to start the second RCDT pump, THEN **perform** the following:

4.1.7.12.1 **Note** the discharge flow rate with a single pump in operation.

4.1.7.12.2 **Start** the second RCDT pump and **verify** that the discharge flow rate increases by at least 15 gpm.

4.1.7.12.3 **Monitor** discharge flow rate, and **secure** one RCDT pump prior to flow decreasing to within 15 gpm of the single pump flow rate. **Return** to step 4.1.7.12.1 and repeat as necessary.

4.1.7.13 WHEN draining is complete, THEN **stop** the RCDT pump.

4.1.7.14 **Close** REFUELING CANAL DRN, N2G21V021 (2-LWP-V-7129).

4.1.7.15 **Close** RCDT LCV Q2G21LCV1003 and place in manual.

4.1.7.16 **Open** RCDT OUTLET ISO N2G21HV7127 (N2G21V006) on LWPP.

4.1.7.17 **Open** RCDT RECIRC ISO N2G21HV7144 (N2G21V106) on LWPP.

4.1.7.18 IF the RCDT was aligned to the WHT, THEN **perform** the following:

4.1.7.18.1 **Close** RCDT DISCH TO WHT Q2G21V009 (2-LWP-V-7137).

4.1.7.18.2 **Open** RCDT PUMP DISCH TO RHT ISO, Q2E21V315 (2-CVC-V-8551).

4.1.7.19 **Restore** the RCDT to normal operation per section 4.1.2.

4.1.8 Processing Nozzle Dam Leakage to RHT.

4.1.8.1 **Verify** closed RCDT VENT, Q2G21V192 (2-LWP-V-7163).

4.1.8.2 **Connect** drain hose(s) from the nozzle dam leakage to the RCDT VENT, Q2G21V192 (2-LWP-V-7163).

4.1.8.3 **Stop** 2A and 2B RCDT pumps.

4.1.8.4 **Open** RCDT VENT, Q2G21V192 (2-LWP-V-7163).

4.1.8.5 **Control** RCDT level and discharge to RHT per step 4.1.2.

4.1.8.6 WHEN nozzle dam leakage processing to RHT is no longer required, THEN **perform** the following:

4.1.8.6.1 **Stop** 2A and 2B RCDT pumps.

4.1.8.6.2 **Close** RCDT VENT, Q2G21V192 (2-LWP-V-7163).

4.1.8.6.3 **Remove** nozzle dam drain hose from RCDT vent.

4.1.9 Draining the RCS Loops for Maintenance Via the Reactor Coolant Drain System.

4.1.9.1 **Verify** core unload is completed.

4.1.9.2 **Verify** both trains of RHR are secured.

4.1.9.3 **Verify** nozzle dam leakage processing is secured per step 4.1.8.6.

4.1.9.4 IF the SFP purification loop is in service, THEN **remove** from service per FNP-2-SOP-54.0, SPENT FUEL PIT COOLING AND PURIFICATION SYSTEM.

4.1.9.5 IF RWST purification is in operation, THEN **remove** from service per FNP-2-SOP-54.0, SPENT FUEL PIT COOLING AND PURIFICATION SYSTEM.

4.1.9.6 **Open** the SFP PURIF OUTLET TO RWST, N2G31V021B (2-SFP-V-8793B).

4.1.9.7 **Open** the RWP PUMP DISCH ISO, N2G31V008 (2-SFP-V-8792).

4.1.9.8 **Close** the RCDT PUMP DISCH TO RHT ISO, Q2E21V315 (2-CVC-V-8551).

4.1.9.9 **Open** the RCDT DISCH TO SFPCS RWPP SUCT, Q2G21V008 (2-LWP-V-7138).

4.1.9.10 **Close** the RCDT RECIRC ISO 2-LWP-HV-7144 (N2G21V106)

4.1.9.11 **Close** the RCDT OUTLET ISO N2G21HV7127 (N2G21V006).

4.1.9.12 **Verify** open DRAIN HEADER ISO DOWNSTREAM OF SPECTACLE FLANGES, N2G21V0364. (CTMT 107' between RCDT and RCDT Pumps)

4.1.9.13 **Open** the desired RCS LOOP TO RCDT PUMP ISO:

- Q2B13V002A, (2-RC-V-8057A) and
- Q2B13V001A, (2-RC-V-8058A) for Loop 2A

- Q2B13V002B, (2-RC-V-8057B) and
- Q2B13V001B, (2-RC-V-8058B) for Loop 2B

- Q2B13V002C, (2-RC-V-8057C) and
- Q2B13V001C, (2-RC-V-8058C) for Loop 1C

4.1.9.14 **Open** the RCDT PUMPS DISCH LINE ISO 2-LWP-HV-7136 (Q2G21V006).

4.1.9.15 **Start** 2A (B) RCDT pump.

4.1.9.16 **Adjust** the RCDT LCV Q2G21LCV1003 (Q2G21V064) in manual to control the draining rate and maintain RCDT pump flow to $\leq$ 100 gpm.

4.1.9.17 IF unable to maintain RCDT discharge flow greater than minimum to maintain pump in operation, THEN **perform** the following:

4.1.9.17.1 **Open** RCDT OUTLET ISO N2G21HV7127 (N2G21V006)

4.1.9.17.2 **Open** RCDT RECIRC ISO N2G21HV7144 (N2G21V106)

4.1.9.17.3 **Place** RCDT LCV Q2G21LCV1003 (Q2G21V064) in automatic and **adjust** to maintain RCDT level as desired.

4.1.9.18 WHEN RWST level reaches 39 feet, THEN **perform** the following:

4.1.9.18.1 **Shift** RCDT discharge to RHT by performing the following:

1. Opening RCDT PUMP DISCH TO RHT ISO, Q2E21V315 (2-CVC-V-8551)

AND

2. Closing RCDT DISCH TO SFPCS RWPP SUCT, Q2G21V008 (2-LWP-V-7138).

4.1.9.19 WHEN the desired RCS level is reached, THEN **stop** the 2A (2B) RCDT pump.

4.1.9.20 **Close** the RCS loop to RCDT pump isolation valve(s) opened in step 4.1.9.13.

4.1.9.21 **Verify** closed RCDT DISCH TO SFPCS RWPP SUCT, Q2G21V008 (2-LWP-V-7138).

4.1.9.22 **Verify** open RCDT PUMP DISCH TO RHT ISO, Q2E21V315 (2-CVC-V-8551).

4.1.9.23 **Close** SFP PURIF OUTLET TO RWST, N2G31V021B (2-SFP-V-8793B).

4.1.9.24 **Close** the RWP PUMP DISCH ISO, N2G31V008 (2-SFP-V-8792).

4.1.9.25 **Verify** open RCDT OUTLET ISO N2G21HV7127 (N2G21V006).

4.1.9.26 **Verify** open RCDT RECIRC ISO, N2G21HV7144 (N2G21V106).

4.1.9.27 **Place** the RCDT in service per section 4.1.2.

4.1.10 Establishing a Hydrogen Blanket in the RCDT.

4.1.10.1 **Verify** that the oxygen concentration in the RCDT gas space is less than 5% by volume.

4.1.10.2 RCDT system is aligned per system checklist FNP-1-SOP-50.0A.

4.1.10.3 An RHT is aligned for service per FNP-2-SOP-2.4, CVCS BORON RECYCLE SYSTEM.

4.1.10.4 **Close** the following RCDT vent line iso valves:
- RCDT VENT LINE ISO, Q2G21HV7126 (MCB)
- RCDT VENT LINE ISO, Q2G21HV7150 (MCB)

NOTE: Reference FNP-0-ACP-36.0, COMPRESSED GAS SAFETY, as required, before performing steps involving a gas cylinder. (AI 2002202992)

4.1.10.5 **Verify** the hydrogen bottle is attached to the supply line AND bottle isolation valves are open, THEN **open** H_2 bottle to RCDT ISO, N2G21V340.

4.1.10.6 **Close** H_2 SUPP TO RCDT, Q2G21V211 (2-LWP-V-7125).

4.1.10.7 **Open** RCDT VENT, Q2G21V192 (2-LWP-V-7163).

4.1.10.8 **Establish** excess letdown to RCDT per FNP-2-SOP-2.7, CVCS EXCESS LETDOWN.

4.1.10.9 **Start** an RCDT pump and recirculate tank while tank is filling to ensure air is not entrapped in lines.

4.1.10.10 WHEN water comes out of the vent, THEN **stop** the RCDT pump and **close** RCDT VENT, Q2G21V192 (2-LWP-V-7163).

4.1.10.11 **Remove** excess letdown from service per FNP-2-SOP-2.7, CVCS EXCESS LETDOWN.

4.1.10.12 **Open** H_2 SUPP TO RCDT, Q2G21V211 (2-LWP-V-7125).

4.1.10.13 **Verify** open the following valves:
- RCDT VENT LINE ISO Q2G21HV7126 (MCB).
- RCDT VENT LINE ISO Q2G21HV7150 (MCB).

4.1.10.14 **Verify** the following:
- H_2 SUPP TO RCDT, Q2G21PCV7155 (Q2G21V063) is set to maintain 3.0 psig.
- GAS DISCH FROM RCDT, Q2G21PCV7152 (Q2G21V002) is set to maintain 6.0 psig.

4.1.10.15 **Start** a RCDT pump.

4.1.10.16 **Regulate** RCDT LCV, Q2G21LCV1003 (Q2G21V064) in manual to pump tank level down to 20%.

4.1.10.17 IF needed, THEN **place** RCDT in normal operation per section 4.1, IF NOT, stop the pump and close RCDT LCV, Q2G21LCV1003 (Q2G21V064).

4.1.10.18 IF H_2 supply to the RCDT is NOT to be maintained, THEN **close** the bottle isolation valves AND **close** H_2 BOTTLE TO RCDT ISO, N2G21V340.

4.1.11 Establishing a Nitrogen Atmosphere in the RCDT

4.1.11.1 RCDT system is aligned per system checklist FNP-2-SOP-50.0A, REACTOR COOLANT DRAIN COLLECTION AND DISCHARGE, and is aligned for normal operation per FNP-2-SOP-50.0, LIQUID WASTE PROCESSING SYSTEM.

4.1.11.2 The waste gas system is in service and capable of receiving gas from the RCDT.

4.1.11.3 **Close** the following valves:
- RCDT VENT LINE ISO Q2G21HV7126 (MCB)
- RCDT VENT LINE ISO Q2G21HV7150 (MCB)

4.1.11.4 **Verify** nitrogen bottle is attached to the supply line and bottle isolations are open (155' outside MSVR).

4.1.11.5 **Open** N2 BOTTLE TO RCDT ISO, N2G21V339 (155' outside MSVR) and **close** H_2 BOTTLE TO RCDT ISO, N2G21V340.

4.1.11.6 **Ensure** the following pressure regulators are set as follows:

- H_2 SUPP TO RCDT 2-LWP-PCV-7155 (Q2G21V063) set to maintain 3.0 psig.
- GAS DISCH FROM RCDT, 2-LWP-PCV-7152 (Q2G21V002) set to maintain 6.0 psig.

NOTE: When filling the RCDT, the gas discharge valve from the RCDT should be set to maintain 3 psig Q2G21V0002 (2-LWP-PCV-7152) GAS DISCH FROM RCDT and the Q2G21V0063 (2-LWP-PCV-7155) H2 SUPP TO RCDT should be closed if RCDT pressure is ≥ 3 psig. This will allow H_2 to be purged to the Waste Gas System.

4.1.11.7 **Verify** open the following valves (outside MSVR).

- H2 BOTTLES SUPP TO RCDT ISO, N2G21V284.
- H2 SUPP TO RCDT PCV OUTLET ISO, Q2G21V062 (2-LWP-V-7165).
- H2 SUPP TO RCDT PCV OUTLET ISO, Q2G21V061 (2-LWP-V-7154).

4.1.11.8 **Verify** air cut in to H_2 SUPP TO RCDT Q2G21V063 (2-LWP-PCV-7155).

4.1.11.9 **Open** RCDT VENT LINE ISO, Q2G21HV7126.

4.1.11.10 **Open** RCDT VENT LINE ISO. Q2G21HV7150.

4.1.11.11 **Establish** RCDT pressure of 8 psig by adjusting H_2 SUPP TO RCDT Q2G21V063 (2-LWP-V-7155) as needed. IF pressure is raised, THEN **verify** N_2 flow to the RCDT as evidenced by an increase in RCDT pressure and/or a decrease in N_2 bottle pressure. WHEN RCDT pressure is at 8 psig, THEN **adjust** H_2 SUPP TO RCDT Q2G21V063 (2-LWP-V-7155) to 0 psig.

NOTES:
- Sampling of the RCDT is done in the 121' Piping Penetration Room. Sampling will not necessarily be done on the first burp, but should be performed on all subsequent burps. The sample should be obtained near the end of the burp to ensure that the sample obtained is representative of the RCDT atmosphere instead of being representative of the bulk N_2 supply to the RCDT.
- An actual transfer of gas from the RCDT to the GDT must be in progress in order for Chemistry to take their sample. This evolution must be closely coordinated with Chemistry personnel.

4.1.11.12 **Notify** Chemistry to be ready to sample the RCDT during the burp, if desired.

4.1.11.13 **Set** the GAS DISCH FROM RCDT, 2-LWP-PCV-7152 to maintain 3 psig (Q2G21V002).

4.1.11.14 **Verify** RCDT LCV Q2G21LCV1003 in MANUAL and close.

NOTE: A level hose may be used to monitor level changes in the RCDT if the installed level transmitter is not functioning properly AND containment is accessible.

4.1.11.15 **Perform** the following to raise RCDT level to approximately 90% to purge gas from the RCDT to the Waste Gas System.

A. **Stop** all operating RCDT pumps.

B. **Close** RCDT OUTLET ISO N2G21HV7127.

C. **Verify** open RCDT RECIRC ISO N2G21HV7144.

D. **Open** RCDT VENT TO WGC SUCT ISO, Q2G22V010 (100'El Aux Building).

E. **Open** PRT DRAIN TO RCDT ISO. N2B13HV8031 (MCB).

CAUTION: Monitor PRT pressure during drain to RCDT to ensure a positive pressure is maintained on the PRT.

NOTE: IF it is necessary to use the RCDT pump to fill the RCDT per the following step, THEN the pump should be started and stopped as necessary to allow the gas from the RCDT atmosphere to bleed off to the waste gas system without overwhelming the waste gas compressor.

F. If gravity drain is NOT sufficient to transfer water from the PRT, THEN **run** a RCDT pump as needed per the above note.

G. **Monitor** RCDT level, pressure, and waste gas decay tank pressure as the water transfer proceeds to ensure proper system response.

H. **Coordinate** with Chemistry personnel to obtain sample, if required, per the note preceding step 4.1.11.12.

NOTE: It may be necessary to fill the PRT to the normal level using FNP-2-SOP-1.2, section 4.3.

4.1.11.16 WHEN RCDT level has been raised to approximately 90% and the RCDT GAS PRESS is approximately 3 psig, THEN **perform** the following:

A. **Stop** all operating RCDT pumps.

B. **Close** PRT DRAIN ISO. N2B31V8031. (MCB)

C. **Close** RCDT VENT TO WGC SUCT ISO, Q2G22V010 (100' Aux Building).

NOTE: Step 4.1.11.16D and 4.1.11.16E may be marked N/A if the RCDT can not be recirculated due to valve/pump problems, etc.

D. **Open** RCDT OUTLET ISO. N2G21HV7127.

NOTE: N_2 PRESS may have to be added to the RCDT to operate the RCDT Pumps.

E. **Start** a RCDT pump to recirc RCDT contents.

F. WHEN burp is completed as indicated by RCDT pressure falling to ≈ 3 psig, THEN **open** H_2 supp to RCDT, Q2G21V063 (2-LWP-PCV-7155) to maintain approximately 8 psig.

4.1.11.17 **Begin** lowering RCDT level to approximately 30%.

NOTES:
- RCDT drain down rate should be slow enough that H_2 SUPPLY TO RCDT 2-LWP-PCV-7155 (Q2G21V063) can maintain a positive RCDT pressure of 3 psig. Closely monitor RCDT pressure during drain down. Change out the N_2 cylinder outside the MSVR as required.
- IF the RCDT can NOT be pumped down due to some problem, THEN drain the RCDT using RCDT drain Q2G21V207.

A. Using the controller on the LWPP **throttle** open REACTOR COOLANT DRN TANK LCV, Q2G21LCV1003 to slowly lower RCDT level to 30%.

B. WHEN RCDT level is approximately 30%, THEN **close** REACTOR COOLANT DRN TANK LCV, Q2G21LCV1003 and **stop** the running RCDT pump.

4.1.11.18 **Repeat** step 4.1.11.11 through 4.1.11.17 until the hydrogen concentration is acceptable for chemical degas per Chemistry group requirements.

4.1.11.19 WHEN N_2 purge no longer required, THEN **close** N_2 BOTTLE TO RCDT ISO, N2G21V339 (outside MSVR).

4.1.11.20 **Return** setting of H_2 SUPP TO RCDT 2-LWP-PCV-7155 (Q2G21V063) and GAS DISCH FROM RCDT, 2-LWP-PCV-7152 (Q2G21V002) to maintain 3.0 psig and 6 psig, respectively.

4.1.11.21 **Place** MCB handswitch for REACTOR COOLANT DRN TANK LCV Q2G21LCV1003 to OPEN and **allow** to spring return to AUTO.

NOTE: Tank levels shall be monitored periodically during processing, discharge or transfer of liquid waste. ALL tank levels should be monitored, including non- source and non-destination tanks. CR# 2010102358

4.2 WASTE HOLD-UP TANK OPERATION

4.2.1 Waste Hold-Up Tank Recirculation and Sampling

4.2.1.1 Waste hold-up tank system is aligned per FNP-2-SOP-50.0B, LIQUID WASTE PROCESSING SYSTEM.

4.2.1.2 **Start** waste evaporator feed pump.

NOTE: Prior to discharge, the WHT must be sampled and the sample checked for chromates.

4.2.1.3 **Perform** the following:

a. **Obtain** a WHT sample.

b. Visually **check** sample for chromates by placing a white sheet of paper behind the sample for comparison to verify water is clear with no yellow tint.

4.2.2 WHT discharge to disposable demineralizer system

4.2.2.1 **Proceed** per FNP-0-SOP-50.7, LIQUID WASTE PROCESSING USING THE DISPOSABLE DEMINERALIZER SYSTEM.

4.2.3 Waste Holdup Tank Discharge to the Floor Drain Tank

4.2.3.1 IF required to monitor floor drain tank level with a level hose and the hose has not been previously installed, THEN **perform** Appendix 5.

4.2.3.2 IF it is necessary to monitor and or determine the level of the floor drain tank with a level hose attached, THEN **follow** the guidance in step 4.5.1.3.

4.2.3.3 In the 139' filter room **close** WASTE EVAP FEED FILTER OUTLET, Q2G21V019 (2-LWP-V-7244).

4.2.3.4 At the liquid waste panel, **start** the waste evaporator feed pump.

4.2.3.5 In the waste evaporator feed pump room, **open** WEFP DISCH TO FDT ISO, Q2G21V027 (2-LWP-V-7240).

4.2.3.6 In the waste evaporator feed pump room, **open** WEFF INLET, Q2G21V020 (2-LWP-V-7239).

4.2.3.7 WHEN WHT to FDT discharge is complete, THEN **perform** the following:

1. **Stop** the waste evaporator feed pump.
2. **Close** WEFF INLET, Q2G21V020 (2-LWP-V-7239).

4.2.3.8 **Close** WEFP DISCH TO FDT ISO, Q2G21V027 (2-LWP-V-7240).

4.2.3.9 **Open** WASTE EVAP FEED FILTER OUTLET, Q2G21V019 (2-LWP-V-7244).

4.2.4 Draining the WHT to the FDT

NOTES:
- Health Physics coverage is required for the performance of this procedure due to the potential for contamination.
- Draining should be done at a controlled rate to reduce splashing and the spread of contamination.

4.2.4.1 IF required to monitor floor drain tank level with a level hose and the hose has not been previously installed, THEN **perform** Appendix 5.

4.2.4.2 IF it is necessary to monitor and or determine the level of the floor drain tank with a level hose attached, THEN **follow** the guidance in step 4.5.1.3.

4.2.4.3 **Verify** that the waste evaporator feed pump is not running.

4.2.4.4 **Verify** that the WEFF INLET, Q2G21V020 (2-LWP-V-7239) is closed.

4.2.4.5 **Verify** closed WASTE GAS PROCESSING RM SUMP PUMPS DISCH TO WHT, N2G21V159A.

4.2.4.6 **Verify** open WASTE GAS PROCESSING RM SUMP PUMPS DISCH TO FDT, N2G21V159B (located in the recombiner hallway).

NOTE: Removing the drain grating will reduce splashing. Remove grating if possible.

4.2.4.7 Slowly **throttle** open WHT DRN, Q2G21V029 (2-LWP-V-7234).

4.2.4.8 **Verify** the waste gas processing room sump pump starts and is pumping down the sump as the WHT is being drained to it. IF the pumps are not keeping up with drain rate OR the drains back up, THEN **secure** draining immediately and **contact** HP and **notify** the control room.

4.2.4.9 WHEN draining is complete, THEN **close** WHT DRN, Q2G21V029 (2-LWP-V-7234) and **have** HP survey the area around the floor drain.

4.2.5 Waste Evaporator Feed Filter Isolation for Filter Element Replacement

4.2.5.1 **Proceed** to Appendix 6.

NOTE: Tank levels shall be monitored periodically during processing, discharge or transfer of liquid waste. ALL tank levels should be monitored, including non- source and non-destination tanks. CR# 2010102358

4.3 WECT OPERATIONS

NOTE: WHEN starting waste evaporator condensate pump, THEN the handswitch for pump must be held in ON position until indication for N2G21V331, WECT PUMP DISCHARGE AOV, shows full open.

4.3.1 WECT Recirculation and Sampling

4.3.1.1 WECT system is aligned per system check list FNP-2-SOP-50.0B, LIQUID WASTE PROCESSING SYSTEM.

4.3.1.2 **Close** WECT INLET ISO, Q2G21V217 (2-LWP-V-7221)

4.3.1.3 **Start** waste evaporator condensate tank pump.

4.3.1.4 **Notify** the Shift Radio Chemist to obtain a sample.

4.3.1.5 IF desired, THEN **remove** the tank from recirc by performing the following:

A. **Stop** the WASTE EVAPORATOR CONDENSATE TANK PUMP

B. **Open** Q2G21V217 (2-LWP-V-7221), WECT INLET ISO

NOTE: Tank levels shall be monitored periodically during processing, discharge or transfer of liquid waste. ALL tank levels should be monitored, including non- source and non-destination tanks. CR# 2010102358

4.3.2 WECT discharge to WHT.

4.3.2.1 WECT pump is on and in recirculation mode per 4.3.1.

In the Filter Room:

4.3.2.2 **Open** WASTE EVAP CNDS PUMP DISCH TO WHT, Q2G21V085 (2-LWP-V-7218).

4.3.2.3 **Open** WASTE EVAP CNDS FILTER OUTLET, Q2G21V084 (2-LWP-V-7217).

4.3.2.4 IF tank contents are to be routed through the waste evap condensate demineralizer, THEN **perform** the following. IF NOT, THEN **proceed** to step 4.3.2.5.

A. **Open** WASTE EVAP CNDS DEMIN INLET, Q2G21V086 (2-LWP-V-7203).

B. **Open** WASTE EVAP CNDS DEMIN OUTLET, Q2G21V225 (2-LWP-V-7212).

C. **Close** WASTE EVAP CNDS DEMIN BYPASS, Q2G21V216 (2-LWP-V-7213).

In the WECT Room:

4.3.2.5 **Verify** closed WECT INLET ISO, Q2G21V217 (2-LWP-V-7221).

4.3.2.6 **Open** the following valves:

A. WASTE EVAP CNDS PUMP DISCH TO WASTE EVAP CNDS DEMIN, Q2G21V087 (2-LWP-V-7232).

B. WASTE EVAP CNDS PUMP DISCH, Q2G21V230 (2-LWP-V-7225).

4.3.2.7 WHEN discharge of WECT is completed, THEN **stop** the pump and **perform** the following:

In the Filter Room:

A. IF tank contents were routed through the waste evap condensate demineralizer, THEN **perform** the following. IF NOT, THEN **proceed** to step 4.3.2.7.b.

- **Close** WASTE EVAP CNDS DEMIN INLET, Q2G21V086 (2-LWP-V-7203).
- **Close** WASTE EVAP CNDS DEMIN OUTLET, Q2G21V225 (2-LWP-V-7212).
- **Open** WASTE EVAP CNDS DEMIN BYPASS, Q2G21V216 (2-LWP-V-7213).

B. **Close** WASTE EVAP CNDS FILTER OUTLET, Q2G21V084 (2-LWP-V-7217).

- **Close** WASTE EVAP CNDS PUMP DISCH TO WHT, Q2G21V085 (2-LWP-V-7218).

In the WECT Room:

- **Open** WECT INLET ISO, Q2G21V217 (2-LWP-V-7221).
- **Close** WASTE EVAP CNDS PUMP DISCH TO WASTE EVAP CNDS DEMIN, Q2G21V087 (2-LWP-V-7232).
- **Close** WASTE EVAP CNDS PUMP DISCH, Q2G21V230 (2-LWP-V-7225).

NOTE: Tank levels shall be monitored periodically during processing, discharge or transfer of liquid waste. ALL tank levels should be monitored, including non- source and non-destination tanks. CR# 2010102358

4.3.3 WECT Discharge to WMT #2

4.3.3.1 WECT pump is on and in recirculation mode per 4.3.1.

4.3.3.2 IF tank contents are to be routed through the waste monitor tank demineralizer, THEN **perform** the following, IF NOT, **proceed** to step 4.3.3.3.

- **Open** WMT DEMIN OUTLET, Q2G21V094 (2-LWP-V-7434) (demineralizer valve area).

In the Filter Rooms:

- **Close** WASTE MONITOR TANK DEMIN BYP, Q2G21V125 (2-LWP-V-7428).
- **Close** FLOOR DRN TANK DISCH TO #1 WMT ISO, Q2G21V089 (2-LWP-V-7412).
- **Close** WMT DISCH TO DEMIN, N2G21V355.
- **Open** WMT DISCH TO FLOOR DRN TANK LINE, Q2G21V093B (2-LWP-V-7438B)
- **Open** FLOOR DRN TANK TO WMT DEMIN, Q2G21V091 (2-LWP-V-7452)

Proceed to step 4.3.3.4.

4.3.3.3 **Close** FLOOR DRN TANK DISCH TO #1 WMT ISO, Q2G21V089 (2-LWP-V-7412).

4.3.3.4 IF tank contents are to be routed thru the waste evaporator condensate demineralizer, THEN **perform** the following, IF NOT, **proceed** to 4.3.3.5.

- **Open** WASTE EVAP CNDS DEMIN INLET, Q2G21V086 (2-LWP-V-7203) (demin. valve access area on 139' elevation).
- **Open** WASTE CNDS DEMIN OUTLET, Q2G21V225 (2-LWP-V-7212) (filter room).
- **Close** WASTE EVAP CNDS DEMIN BYPASS, Q2G21V216 (2-LWP-V-7213) (filter room).

4.3.3.5 **Open** WASTE EVAP CNDS FILTER OUTLET VALVE, Q2G21V084 (2-LWP-V-7217).

4.3.3.6 **Open** WASTE CNDS DISCH TO WASTE MONITOR TANK, Q2G21V220 (2-LWP-V-7219).

In the Waste Evaporator Condensate Tank Room:

4.3.3.7 **Verify** closed WASTE EVAP CNDS TANK INLET ISO, Q2G21V217 (2-LWP-V-7221).

4.3.3.8 **Open** the following valves:

- WASTE EVAP CNDS PUMP DISCH ISO, Q2G21V230 (2-LWP-V-7225)
- WASTE EVAP CNDS TANK PUMP DISCH TO WASTE EVAP CNDS DEMIN, Q2G21V087 (2-LWP-V-7232).

4.3.3.9 **Estimate** the time that the WMT will reach 80% level. The estimated time to reach 80% may be determined by timing the WMT level increase for at least 5% and extrapolating the time to reach 80%. (IR 2-96-167)

4.3.3.10 WHEN the WMT reaches 80%, THEN continuously **monitor** the WMT level indication to ensure the WMT filling is secured prior to exceeding 85%. (IR 2-96-167)

CAUTION: The WECT is subject to siphoning when pumping to a WMT. Closing WASTE CNDS DISCH TO WASTE MONITOR TANK, Q2G21V220, after stopping the waste condensate pump will prevent possible overflowing of the WMT.

4.3.3.11 WHEN discharge of WECT is completed, THEN **perform** the following:

a. **Stop** the Waste Evaporator Condensate Tank Pump.

b. **Close** WASTE CNDS DISCH TO WASTE MONITOR TANK, Q2G21V220 (2-LWP-V-7219).

c. IF the WECT contents were routed through the WMT demineralizer, THEN **close** WMT DEMIN OUTLET, Q2G21V094 (2-LWP-V-7434) (WMT demin valve area).

In the Filter Rooms:

d. IF tank contents were routed thru the waste evaporator condensate demineralizer, THEN **perform** the following, IF NOT, **proceed** to 4.3.3.11.e.

- **Close** WASTE EVAP CNDS DEMIN INLET, Q2G21V086 (2-LWP-V-7203).
- **Close** WASTE CNDS DEMIN OUTLET, Q2G21V225 (2-LWP-V-7212).
- **Open** WASTE EVAP CNDS DEMIN BYPASS, Q2G21V216 (2-LWP-V-7213).

e. **Close** WASTE EVAP CNDS FILTER OUTLET VALVE, Q2G21V084 (2-LWP-V-7217).

f. IF Waste Evaporator Condensate tank was routed thru the waste monitor tank demineralizer, THEN **perform** the following, IF NOT, **proceed** to 4.3.3.12.

- **Open** WASTE MONITOR TANK DEMIN BYP, Q2G21V125 (2-LWP-V-7428).
- **Open** FLOOR DRN TANK DISCH TO #1 WMT ISO, Q2G21V089 (2-LWP-V-7412).
- **Close** WMT DISCH TO FLOOR DRN TANK LINE, Q2G21V093B (2-LWP-V-7438B)
- **Close** FLOOR DRN TANK TO WMT DEMIN, Q2G21V091 (2-LWP-V-7452)
- **Open** WMT DISCH TO DEMIN N2G21V355.

4.3.3.12 **Open** FLOOR DRN TANK DISCH TO #1 WMT ISO, Q2G21V089 (2-LWP-V-7412).

4.3.3.13 In the Waste Evaporator Cond. Tank Room, **perform** the following:

- **Close** WASTE EVAP CNDS TANK PUMP DISCH TO WASTE EVAP CNDS DEMIN, Q2G21V087 (2-LWP-V-7232).
- **Close** WASTE EVAP CNDS PUMP DISCH ISO, Q2G21V230 (2-LWP-V-7225)
- **Open** WASTE EVAP CNDS TANK INLET ISO, Q2G21V217 (2-LWP-V-7221).

NOTE: Tank levels shall be monitored periodically during processing, discharge or transfer of liquid waste. ALL tank levels should be monitored, including non- source and non-destination tanks. CR# 2010102358

4.3.4 WECT Discharge to WMT #1

4.3.4.1 WECT pump is on and in recirculation mode per 4.3.1.

4.3.4.2 IF tank contents are to be routed thru the waste monitor tank demineralizer, THEN **perform** the following, IF NOT, **proceed** to step 4.3.4.4.

- **Open** WMT DEMIN OUTLET, Q2G21V094 (2-LWP-V-7434) (WMT demin vlv area)

In the Filter Rooms:

- **Close** WASTE MONITOR TANK DEMIN BYP, Q2G21V125 (2-LWP-V-7428).
- **Close** WMT DISCH TO DEMIN, N2G21V355.
- **Close** FLOOR DRN TANK DISCH TO WMT #1 ISO, Q2G21V089 (2-LWP-V-7412).
- **Open** WMT DEMIN DISCH TO #1 WMT, Q2G21V093A (2-LWP-V-7438A).
- **Open** FLOOR DRN TANK TO WMT DEMIN, Q2G21V091 (2-LWP-V-7452).

4.3.4.3 **Proceed** to 4.3.4.5.

4.3.4.4 **Close** WASTE MONITOR TANK DEMIN BYP, Q2G21V125 (2-LWP-V-7428).

4.3.4.5 **Open** WASTE EVAP CNDS FILTER OUTLET, Q2G21V084 (2-LWP-V-7217).

4.3.4.6 **Open** WASTE CNDS DISCH TO WASTE MONITOR TANK, Q2G21V220 (2-LWP-V-7219).

4.3.4.7 IF tank contents are to be routed thru the waste evaporator condensate demineralizer, THEN **perform** the following. IF NOT, **proceed** to 4.3.4.8.

- **Open** WASTE EVAP CNDS DEMIN INLET, Q2G21V086 (2-LWP-V-7203). (Demin. valve access area 139' elevation).
- **Open** WASTE CNDS DEMIN OUTLET, Q2G21V225 (2-LWP-V-7212). (Filter room).
- **Close** WASTE EVAP CNDS DEMIN BYPASS, Q2G21V216 (2-LWP-V-7213). (Filter room).

4.3.4.8 **Verify** closed WASTE EVAP CNDS TANK INLET ISO, Q2G21V217 (2-LWP-V-7221).

4.3.4.9 **Open** WASTE EVAP CNDS TANK PUMP DISCH TO WASTE EVAP CNDS DEMIN, Q2G21V087 (2-LWP-V-7232).

4.3.4.10 **Open** WASTE EVAP CNDS PUMP DISCH ISO, Q2G21V230 (2-LWP-V-7225)

4.3.4.11 **Estimate** the time that the WMT will reach 80% level. The estimated time to reach 80% may be determined by timing the WMT level increase for at least 5% and extrapolating the time to reach 80%. (IR 2-96-167)

4.3.4.12 WHEN the WMT reaches 80%, THEN continuously **monitor** the WMT level indication to ensure the WMT filling is secured prior to exceeding 85%. (IR 2-96-167)

4.3.4.13 WHEN discharge of liquid waste condensate tank is completed, THEN **stop** the pump.

4.3.4.14. IF tank contents were routed thru the waste evaporator condensate demineralizer, THEN **perform** the following, IF NOT, **proceed** to 4.3.4.15.

- **Close** WASTE EVAP CNDS DEMIN INLET, Q2G21V086 (2-LWP-V-7203). (Demin valve access area 139' elevation).
- **Close** WASTE CNDS DEMIN OUTLET, Q2G21V225 (2-LWP-V-7212). (Filter room).
- **Open** WASTE EVAP CNDS DEMIN BYPASS, Q2G21V216 (2-LWP-V-7213). (Filter room).

4.3.4.15. **Close** the following valves:

- WASTE EVAP CNDS FILTER OUTLET, Q2G21V084 (2-LWP-V-7217).
- WASTE CNDS DISCH TO WASTE MONITOR TANK, Q2G21V220 (2-LWP-V-7219).

4.3.4.16 IF waste evaporator condensate tank was routed thru the waste monitor tank demineralizer, THEN **perform** the following, IF NOT, **proceed** to 4.3.4.17.

- **Close** WMT DEMIN DISCH TO #1 WMT, Q2G21V093A (2-LWP-V-7438A).
- **Close** FLOOR DRN TANK TO WMT DEMIN, Q2G21V091 (2-LWP-V-7452).
- **Open** WASTE MONITOR TANK DEMIN BYP, Q2G21V125 (2-LWP-V-7428).
- **Open** WMT DISCH TO DEMIN, N2G21V355.
- **Open** FLOOR DRN TANK DISCH TO WMT #1 ISO, Q2G21V089 (2-LWP-V-7412).
- **Close** WMT DEMIN OUTLET, Q2G21V094 (2-LWP-V-7434) (WMT demin valve area, 139' elevation).

4.3.4.17 **Open** or **verify** open WASTE MONITOR TANK DEMIN BYP, Q2G21V125 (2-LWP-V-7428).

4.3.4.18 **Close** WASTE EVAP CNDS TANK PUMP DISCH TO WASTE EVAP CNDS DEMIN, Q2G21V087 (2-LWP-V-7232).

4.3.4.19 **Close** WASTE EVAP CNDS PUMP DISCH ISO, Q2G21V230 (2-LWP-V-7225)

4.3.4.20 **Open** WASTE EVAP CNDS TANK INLET ISO, Q2G21V217 (2-LWP-V-7221).

4.3.5 Draining the Contents of a Contaminated WECT

4.3.5.1 IF the WECT is on recirc, THEN **go** to step 4.3.1.5 and remove from recirc.

4.3.5.2 **Ensure** sufficient capacity exists in the WHT to receive the contents to be drained from the WECT.

4.3.5.3 **Open** WASTE EVAP CNDS TK DRN, Q2G21V235 (2-LWP-V-7223) to drain contents of WECT to the WHT.

4.3.5.4 WHEN WECT draining is completed, THEN **close** WASTE EVAP CNDS TK DRN, Q2G21V235 (2-LWP-V-7223)

4.3.5.5 **Proceed** to section 4.2 for processing the WHT.

NOTE: Tank levels shall be monitored periodically during processing, discharge or transfer of liquid waste. ALL tank levels should be monitored, including non- source and non-destination tanks. CR# 2010102358

4.4 CDT OPERATION

4.4.1 Draining the CDT to the WHT

4.4.1.1 **Verify** WHT level ≥ 30% and < 90%.

4.4.1.2 **Attach** hose to CDT DRN Q2G21V238 and **route** to equipment drain.

4.4.1.3 **Open** CDT DRN Q2G21V238.

4.4.1.4 **Drain** CDT to approximately 5-15% level.

4.4.1.5 **Close** CDT DRN Q2G21V238.

4.4.1.6 **Remove** hose.

NOTE: Two OPS personnel will be required for this task and a catch bag should be installed below the vent line to prevent the potential spread of contamination in case of overflow while applying air to the CDT.

4.4.2 Unclogging the CDT Drain

4.4.2.1 **Coordinate** with HP for coverage.

4.4.2.2 **Verify** closed CDT DRN, Q2G21V238.

NOTE: In the following step, the purpose of the vent valve in line with the air hose is to allow pressure to be vented from the hose before disconnecting from the SA connection and the CDT drain.

4.4.2.3 **Obtain** air hose with a flow restrictor and vent valve.

4.4.2.4 **Verify** air hose vent valve closed.

4.4.2.5 **Connect** air hose to the nearest SA connection.

4.4.2.6 **Connect** air hose to the CDT DRN, Q2G21V238.

4.4.2.7 Slowly **throttle** open the SA ISO valve.

CAUTION:	Opening CDT DRN, Q2G21V238 too quickly or too far may result in blowing contaminated water out of the tank vent. Listen and feel for air flow through the drain line while throttling the valve open to prevent overflow of the tank.

4.4.2.8 **Initiate** air flow to dislodge the clog per the following:

A. Slowly **throttle** open Q2G21V238 to dislodge debris.

B. **Monitor** tank overflow and close Q2G21V238 if overflowing.

C. WHEN air flow is heard through the drain line, THEN **close** Q2G21V238.

4.4.2.9 **Close** the SA ISO valve.

4.4.2.10 **Perform** the following:

A. Carefully **vent** the air hose using the air hose vent valve.

B. **Disconnect** air hose from SA connection.

C. **Coordinate** with HP for removal of air hose from drain line to check for proper draining.

4.4.2.11 **Perform** section 4.4.1 and check for proper draining.

4.4.2.12 IF no drain flow, THEN **repeat** steps 4.4.2.2 through 4.4.2.10 as necessary to clear line.

4.4.2.13 IF drain flow is adequate, THEN **coordinate** with HP for removal and storage of air hose and connections used.

4.5 FLOOR DRAIN TANK (FDT) SYSTEM OPERATION

NOTE: Tank levels shall be monitored periodically during processing, discharge or transfer of liquid waste. ALL tank levels should be monitored, including non- source and non-destination tanks. CR# 2010102358

CAUTION: IF it is known or suspected that chromates are present in the FDT, THEN notify the Shift Chemist prior to transferring or processing the tank.

4.5.1 FDT Recirculation and Sampling

4.5.1.1 Floor drain tank system is aligned per system check list FNP-2-SOP-50.0C, LIQUID WASTE PROCESSING SYSTEM

4.5.1.2 IF required to monitor floor drain tank level with a level hose and the hose has not been previously installed, THEN **perform** Appendix 5.

4.5.1.3 IF level hose is installed and it is required to monitor floor drain tank level with the hose, THEN **open** FLOOR DRAIN TANK DRN, Q2G21V130 and **perform** the following:

- **Calculate** the amount of waste water to be transferred.
- **Ensure** FDT level will be ≥ 15% AFTER the transfer is completed.
- **Monitor** waste water transfer via the level increase in the tank receiving the water.
- **Close** the floor drain tank drain. Q2G21V130

NOTE: Sampling is required prior to transferring waste between units, prior to direct transfer to a WMT, or if chromates or other chemicals are suspected of being in the source tank.

Sampling may be waived with Chemistry concurrence if repetitive draining of a system is being performed and previous samples have been within limits.

4.5.1.4 **Start** FDT pump and **notify** the Shift Radio Chemist to obtain sample, IF required.

CAUTION:	The contents of the FDT must be sampled and the sample analyzed prior to discharge to a WMT.

NOTE:	Tank levels shall be monitored periodically during processing, discharge or transfer of liquid waste. ALL tank levels should be monitored, including non- source and non-destination tanks. CR# 2010102358

4.5.2 FDT Discharge to Waste Monitor Tank #2 (WMT)

4.5.2.1 Floor drain tank pump is on and in recirculation mode as per 4.5.1.

4.5.2.2 **Close** FLOOR DRAIN TANK DISCH TO #1 WMT, Q2G21V089 (2-LWP-V-7412) (In FDT filter room).

4.5.2.3 IF floor drain tank contents are NOT to be processed through the WMT demineralizer, THEN **proceed** to 4.5.2.4; IF it is, THEN **perform** the following:

- **Open** WMT DEMIN OUTLET, Q2G21V094 (2-LWP-V-7434) (WMT demin valve area).

In the Filter Rooms:

- **Close** WMT DEMIN BYP, Q2G21V125 (2-LWP-V-7428).
- **Close** WMT DISCH TO DEMIN, N2G21V355.
- **Open** FLOOR DRN TANK TO WMT DEMIN, Q2G21V091 (2-LWP-V-7452).
- **Open** WMT DEMIN DISCH TO FLOOR DRN TANK LINE, Q2G21V093B (2-LWP-V-7438B).

4.5.2.4 Perform the following:

- **Close** FLOOR DRN TANK DISCH TO WASTE EVAP, Q2G21V267 (2-LWP-V-7427).
- **Open** FLOOR DRN TANK FILTER OUTLET, Q2G21V189 (2-LWP-V-7456).
- **Open** FLOOR DRAIN TANK STRAINER DISCH, N2G21V118 (2-LWP-V-7421) (FDT Pump Room).

4.5.2.5 **Estimate** the time that the WMT will reach 80% level. The estimated time to reach 80% may be determined by timing the WMT level increase for at least 5% and extrapolating the time to reach 80%. (IR 2-96-167)

4.5.2.6 WHEN the WMT reaches 80%, THEN continuously **monitor** the WMT level indication to ensure the WMT filling is secured prior to exceeding 85%. (IR 2-96-167)

4.5.2.7 WHEN discharge of floor drain tank is completed, THEN **stop** the pump and **perform** the following alignments:

A. IF tank contents were routed thru the WMT demineralizer, THEN **perform** the following, IF NOT, **proceed** to 4.5.2.7.B.

- **Close** WMT DEMIN OUTLET, Q2G21V094 (2-LWP-V-7434) (at WMT demin valve area).

In the Filter Rooms:

- **Open** WMT DEMIN BYP, Q2G21V125 (2-LWP-V-7428).
- **Open** WMT DISCH TO DEMIN, N2G21V355.
- **Close** FLOOR DRN TANK TO WMT DEMIN, Q2G21V091 (2-LWP-V-7452).
- **Close** WMT DEMIN DISCH TO FLOOR DRN TANK LINE, Q2G21V093B (2-LWP-V-7438B).

B. Perform the following:

- **Close** FLOOR DRN TANK FILTER OUTLET, Q2G21V189 (2-LWP-V-7456).
- **Open** FLOOR DRAIN TANK DISCH TO #1 WMT, Q2G21V089 (2-LWP-V-7412)
- **Open** FLOOR DRN TANK DISCH TO WASTE EVAP, Q2G21V267 (2-LWP-V-7427).

In the FDT Pump Room:

- Close FLOOR DRAIN TANK STRAINER DISCH, N2G21V118 (2-LWP-V-7421)

CAUTION:	The contents of the FDT must be sampled and the sample analyzed prior to discharge to a WMT.

NOTE:	Tank levels shall be monitored periodically during processing, discharge or transfer of liquid waste. ALL tank levels should be monitored, including non- source and non-destination tanks. CR# 2010102358

4.5.3 FDT discharge to #1 WMT

4.5.3.1 Floor drain tank pump is on and in recirculation mode per 4.5.1.

4.5.3.2 IF FDT contents are NOT to be processed through the WMT demineralizer, THEN **proceed** to 4.5.3.3; IF it is, THEN **perform** the following:

- **Open** WMT DEMIN OUTLET, Q2G21V094 (2-LWP-V-7434) (WMT demin valve area).

In the Filter Rooms:

- **Open** FLOOR DRN TO WMT DEMIN, Q2G21V091 (2-LWP-V-7452).
- **Open** WMT DEMIN TO #1 WMT, Q2G21V093A (2-LWP-V-7438A).
- **Close** WMT DISCH TO DEMIN, N2G21V355.
- **Close** WASTE MONITOR TANK DEMIN BYP, Q2G21V125 (2-LWP-V-7428).
- **Close** FLOOR DRN TANK DISCH TO #1WMT ISO, Q2G21V089 (2-LWP-V-7412).

Proceed to 4.5.3.4.

4.5.3.3 **Close** WASTE MONITOR TANK DEMIN BYP, Q2G21V125 (2-LWP-V-7428).

4.5.3.4 **Close** FLOOR DRN TANK DISCH TO WASTE EVAP, Q2G21V267 (2-LWP-V-7427).

4.5.3.5 **Open** FLOOR DRN TANK FILTER OUTLET, Q2G21V189 (2-LWP-V-7456).

In the FDT Pump Room:

4.5.3.6 **Open** FLOOR DRAIN TANK STRAINER DISCH, N2G21V118 (2-LWP-V-7421)

4.5.3.7 **Estimate** the time that the WMT will reach 80% level. The estimated time to reach 80% may be determined by timing the WMT level increase for at least 5% and extrapolating the time to reach 80%. (IR 2-96-167)

4.5.3.8 WHEN the WMT reaches 80%, THEN continuously **monitor** the WMT level indication to ensure the WMT filling is secured prior to exceeding 85%. (IR 2-96-167)

4.5.3.9 WHEN discharge of floor drain tank is completed, THEN **stop** the pump and **perform** the following alignments:

A. IF tank contents were routed thru the WMT demineralizer, THEN **perform** the following.
IF NOT, **proceed** to 4.5.3.10.

- **Close** WMT DEMIN OUTLET, Q2G21V094 (2-LWP-V-7434) (WMT demin valve area).

In the Filter Rooms:

- **Open** FLOOR DRN TANK DISCH TO #1WMT ISO, Q2G21V089 (2-LWP-V-7412).
- **Open** WMT DISCH TO DEMIN, N2G21V355.
- **Close** FLOOR DRN TO WMT DEMIN, Q2G21V091 (2-LWP-V-7452).
- **Close** WMT DEMIN TO #1 WMT, Q2G21V093A (2-LWP-V-7438A).

4.5.3.10 **Close** FLOOR DRN TANK FILTER OUTLET, Q2G21V189 (2-LWP-V-7456).

4.5.3.11 **Open** FLOOR DRN TANK DISCH TO WASTE EVAP, Q2G21V267 (2-LWP-V-7427).

4.5.3.12 **Open** WASTE MONITOR TANK DEMIN BYP, Q2G21V125 (2-LWP-V-7428).

In the FDT Pump Room:

4.5.3.13 **Close** FLOOR DRAIN TANK STRAINER DISCH, N2G21V118 (2-LWP-V-7421)

NOTE:	Tank levels shall be monitored periodically during processing, discharge or transfer of liquid waste. ALL tank levels should be monitored, including non- source and non-destination tanks. CR# 2010102358

4.5.4 FDT Discharge to WHT

4.5.4.1 FDT pump is on and in recirculation mode per 4.5.1.

In the Filter Rooms:

4.5.4.2 **Close** FDT DISCH TO WASTE EVAP, Q2G21V267 (2-LWP-V-7427).

4.5.4.3 **Open** FDT DISCH TO WHT, Q2G21V123 (2-LWP-V-7426).

In FDT Pump Room:

4.5.4.4 **Open** FDT STRAINER DISCH, N2G21V118 (2-LWP-V-7421).

4.5.4.5 WHEN discharge of the FDT is completed, THEN **stop** the pump and **perform** the following alignment:

a. In the Filter Rooms:

- **Open** FDT DISCH TO WASTE EVAP, Q2G21V267 (2-LWP-V-7427).
- **Close** FDT DISCH TO WHT, Q2G21V123 (2-LWP-V-7426).

In FDT Pump Room:

4.5.4.6 **Close** FDT STRAINER DISCH, N2G21V118 (2-LWP-V-7421).

4.5.5 FDT Discharge to Disposable Demineralizer System

4.5.5.1 **Proceed** to FNP-0-SOP-50.7, LIQUID WASTE PROCESSING USING THE DISPOSABLE DEMINERALIZER.

4.5.6 Floor Drain Tank Filter Isolation for Filter Element Replacement

4.5.6.1 **Proceed** to Appendix 2.

4.5.7 Floor Drain Tank Strainer Isolation for Basket Cleaning or Replacement

4.5.7.1 **Proceed** to Appendix 3

4.6 WASTE MONITOR TANK #1 (2) OPERATION

4.6.1 Waste Monitor Tank #1 (2) Recirculation and Sampling for Discharge to the Environment

4.6.1.1 **Perform** FNP-2-SOP-50.1 APPENDIX 1(2) WASTE MONITOR TANK 1(2) RELEASE TO THE ENVIRONMENT.

NOTE: Tank levels shall be monitored periodically during processing, discharge or transfer of liquid waste. ALL tank levels should be monitored, including non- source and non-destination tanks. CR# 2010102358

4.6.2 #1(2) WMT Discharge to WHT

4.6.2.1 **Close** #1(2) WMT INLET ISO, Q2G21V090 (Q2G21V135).

4.6.2.2 **Verify** closed, #1(2) WMT PUMP DISCH, N2G21V108B (N2G21V108A).

4.6.2.3 **Start** #1(2) WMT Pump.

In The Filter Rooms:

4.6.2.4 **Close** FDT DISCH TO WASTE EVAP, Q2G21V267 (2-LWP-V-7427).

4.6.2.5 **Open** FDT DISCHARGE TO WHT, Q1G21V123 (1-LWP-V-7426).

4.6.2.6 **Close** WMT DISCH TO DEMIN, N2G21V355.

In FDT Pump Room:

4.6.2.7 **Open** WMT PUMP DISCH TO FDT FILT N2G21V356.

In WMT Pump Room:

4.6.2.8 **Open** #1(2) WMT DISCH TO FDT, Q2G21V115 (Q2G21V266).

4.6.2.9 **Open** #1(2) WMT PUMP DISCH, N2G21V108B (N2G21V108A).

4.6.2.10 WHEN discharge of tank contents is completed, THEN **stop** the waste monitor tank pump 1 (2) AND **perform** the following:

In the Filter Rooms:

- **Close** FDT DISCHARGE TO WHT, Q1G21V123 (1-LWP-V-7426).
- **Open** FDT DISCH TO WASTE EVAP, Q2G21V267 (2-LWP-V-7427).
- **Open** WMT DISCH TO DEMIN, N2G21V355.

In FDT Pump Room:

- **Close** WMT PUMP DISCH TO FDT FILT N2G21V356.

In WMT Pump Room:

- **Close** #1(2) WMT DISCH TO FDT, Q2G21V115 (Q2G21V266).
- **Close** #1(2) WMT PUMP DISCH, N2G21V108B (N2G21V108A).
- **Open** #1(2) WMT INLET ISO, Q2G21V090 (Q2G21V135).

NOTE:	Tank levels shall be monitored periodically during processing, discharge or transfer of liquid waste. ALL tank levels should be monitored, including non- source and non- destination tanks. CR# 2010102358

4.6.3 Waste Monitor Tank #1 (2) Transfer to Unit 1 Waste Monitor Tank:

4.6.3.1 **Close** #1(2) WMT INLET ISO, Q2G21V090 (Q2G21V135).

4.6.3.2 **Verify** closed, #1(2) WMT PUMP DISCH, N2G21V108B (N2G21V108A).

4.6.3.3 **Start** #1(2) WMT Pump.

4.6.3.4 **Close** DISPOSABLE DEMIN SYS INLET FROM WHT & FDT, N2G21V345.

4.6.3.5 IF Unit 1 WMT #1 is to receive contents, THEN **perform** the following, IF NOT, **proceed** to 4.6.3.6:

- **Close** #2 WMT DEMIN BYP, Q1G21V125 (1-LWP-V-7428)
- **Open** LAUNDRY & HOT SHOWER TANK TO WMT DEMIN, Q1G21V091A (1-LWP-V-7452A)
- **Open** FDT TO WMT DEMIN, Q1G21V091B (1-LWP-V-7452B)

4.6.3.6 **Open** #1(2) WMT DISCH TO FDT, Q2G21V115 (Q2G21V266).

4.6.3.7 **Open** #1(2) WMT PUMP DISCH, N2G21V108B (N2G21V108A).

4.6.3.8 **Open** WMT PUMP DISCH TO FDT FILT N2G21V356.

A. **Open** FDT DISCHARGE TO WHT, Q1G21V123 (1-LWP-V-7426) to **flush** approximately 100-200 gallons (2-4% level) from the Unit 2 WMT to the Unit 1 WHT, then **close** FDT DISCHARGE TO WHT, Q1G21V123 (1-LWP-V-7426).

B. **Open** FDT FILTER OUTLET, Q1G21V189 (1-LWP-V-7456) to start discharge to Unit 1 WMT 1(2).

4.6.3.9 **Estimate** the time that the WMT will reach 80% level. The estimated time to reach 80% may be determined by timing the WMT level increase for at least 5% and extrapolating the time to reach 80%. (IR 2-96-167)

4.6.3.10 WHEN the WMT reaches 80%, THEN continuously **monitor** the WMT level indication to ensure the WMT filling is secured prior to exceeding 85%. (IR 2-96-167)

4.6.3.11 WHEN discharge of tank contents is complete, THEN **stop** Waste Monitor pump 1(2) AND **perform** the following:

- **Close** #1(2) WMT DISCH TO FDT, Q2G21V115 (Q2G21V266).
- **Close** #1(2) WMT PUMP DISCH, N2G21V108B (N2G21V108A).
- **Open** #1(2) WMT INLET ISO, Q2G21V090 (Q2G21V135).
- **Close** WMT PUMP DISCH TO FDT FILT N2G21V356**.**
- **Close** Unit 1 FDT FILTER OUTLET, Q1G21V189 (1-LWP-V-7456)
- **Open** DISPOSABLE DEMIN SYS INLET FROM WHT & FDT, N2G21V345.

4.6.3.12 IF Unit 1 WMT #1 received tank contents, THEN **perform** the following:

- **Close** LAUNDRY & HOT SHOWER TANK TO WMT DEMIN, Q1G21V091A (1-LWP-V-7452A)
- **Close** FDT TO WMT DEMIN, Q1G21V091B (1-LWP-V-7452B)
- **Open** #2 WMT DEMIN BYP, Q1G21V125 (1-LWP-V-7428)

4.7 WASTE MONITOR TANKS #1 (2) RECIRCULATION THROUGH THE WASTE MONITOR TANK DEMINERALIZER

4.7.1 **Refer** to FNP-2-SOP-50.1, LIQUID WASTE PROCESSING SYSTEM LIQUID WASTE RELEASE FROM WASTE MONITOR TANK.

4.8 MANUALLY DRAINING REFUELING CAVITY TO CTMT SUMP

4.8.1 **Verify** the following valves CLOSED;

- FUEL TRANSFER CANAL DRN, N2G21V172
- REFUELING CANAL DRAIN, N2G21V021 (2-LWP-V-7129).

4.8.2 **Provide** for leakage collection and HP coverage, then **remove** blind flange on cavity drain valve.

4.8.3 **Attach** flange with nipple to drain line using existing gasket.

4.8.4 **Attach** drain hose to nipple and **route** to strainer/filter container supplied by HPS.

4.8.5 **Attach** drain hose to strainer/filter container and **route** to drain (CTMT sump).

4.8.6 With HPS coverage, **throttle** open FUEL TRANSFER CANAL DRN, N2G21V172 to prevent strainer/filter container from overflowing.

NOTE: Ensure all loose particles are being removed by ensuring only clean water is flowing from strainer/filter to CTMT sump.

4.8.7 WHEN draining is completed, THEN **close** FUEL TRANSFER CANAL DRN, N2G21V172.

4.8.8 With HP coverage provided, **remove** drain flange and **reinstall** blind flange on drain line.

4.8.9 **Have** HPS store drain flange with strainer/filter container.

NOTE: Tank levels shall be monitored periodically during processing, discharge or transfer of liquid waste. ALL tank levels should be monitored, including non- source and non-destination tanks. CR# 2010102358

4.9 ALTERNATE PROCESSING OF THE FDT TO THE WHT

4.9.1 IF required to monitor floor drain tank level with a level hose and the hose has not been installed, THEN **perform** Appendix 5.

4.9.2 IF it is necessary to monitor and or determine the level of the floor drain tank with a level hose attached, THEN **follow** the guidance in step 4.5.1.3.

4.9.3 **Procure** a 6" S/S flange with a 6" long x 2" nipple.

4.9.4 **Attach** a 10' x 2" drain hose to the nipple flange.

4.9.5 **Remove** the existing blind flange and **install** the above described drain flange downstream of the FDT DRAIN, Q2G21V130 (2-LWP-V-7414).

NOTE: The Floor Drain Tank room floor drain, drains to the RHR heat exchanger room sump. (AI2006204965)

4.9.6 **Route** hose to floor drain.

4.9.7 **Notify** HP of the intent to drain the FDT to the floor drain system.

4.9.8 **Monitor** the following:

- Waste Hold Up Tank level
- Proper operation of the RHR Heat Exchanger room sump pump (AI2006204965)

4.9.9 **Open** or **throttle** open FDT DRAIN, Q2G21V130 (2-LWP-V-7414) and **drain** the FDT as desired.

4.9.10 WHEN the desired level in the FDT OR WHT is reached, THEN **close** FDT DRAIN, Q2G21V130 (2-LWP-V-7414).

4.9.11 WHEN the normal method of processing the FDT is available, THEN **realign** the Waste Gas Processing Room sump pump discharge to the normal tank (FDT) per FNP-2-SOP-50.2, LIQUID WASTE PROCESSING SYSTEM SUMP PUMP SYSTEM OPERATION.

4.9.12 **Remove** temporary drain flange and **replace** blind flange.

4.9.13 Blue **tag** and **return** the drain flange and hose to the SFP Storage Room.

NOTE: The CASK WASH Area should be pumped to the SFP as much as possible IAW FNP-2-SOP-54.0 before draining to the FDT.

4.10 DRAINING THE CASK WASH AREA TO THE FDT

4.10.1 IF required to monitor floor drain tank level with a level hose and the hose has not been previously installed, THEN **perform** Appendix 5.

4.10.2 IF it is necessary to monitor and or determine the level of the floor drain tank with a level hose attached, THEN **follow** the guidance in step 4.5.1.3.

4.10.3 **Verify** sufficient capacity in the FDT and the system operator is aware of the evolution. (CASK wash area, approx. 31,000 gallon capacity)

4.10.4 **Verify** any additional draining evolutions planned concurrently with draining the Cask Wash area have been evaluated to ensure the floor drain system will not be overloaded.

NOTES:
- The CASK WASH ROOM DRAIN TO FDT ISO, N2G21V927 is a 6 inch valve. Depending on circumstances significant opening of this valve can overload the floor drains and cause them to back up onto the floor potentially spreading contamination.
- The CASK WASH ROOM DRAIN TO FDT ISO, N2G21V927 is located in the 121' batching area approximately 15 feet above floor level and will require a ladder or scaffolding for access.
- It is desirable to have an additional individual monitor the 100' elevation floor drains adjacent to the boric acid pumps while establishing the draining rate.

4.10.5 Slowly **open** CASK WASH ROOM DRAIN TO FDT ISO, N2G21V927 in approximately ¼ turn increments.

4.10.6 **Allow** sufficient time to ensure drain rate equilibrium is obtained while monitoring the 121' elevation floor drain at the batching funnel and the 100' elevation floor drains adjacent to the boric acid transfer pumps and in the hallway adjacent to the charging pump suction valves.

4.10.7 **Continue** slowly opening CASK WASH ROOM DRAIN TO FDT ISO, N2G21V927 in approximately ¼ turn increments until an acceptable drain rate is obtained without backup through the floor drains.

4.10.8 WHEN the cask wash area draining is complete, THEN **close** CASK WASH ROOM DRAIN TO FDT ISO, N2G21V927.

5.0 REFERENCES

5.1 Drawings P & ID - 205042, sheets 1-4, Waste Processing System.

5.2 Westinghouse System Description, SD-ALA-407.

5.3 Test Procedure, ALA/APR-SU-5.5.1 and 5.5.2.

5.4 Westinghouse Technical Manual, U-258243.

5.5 Drawing P & ID - 205008, Closed Loop Aux. Stm. and Cnds. Recovery System.

5.6 B-205787, Liquid Waste Instrument Loop Diagrams

APPENDIX 1

Use of the RCDT LCV-1003 Controller
(Q2G21LCV1003)

1. To select Automatic (AUTO) or Manual (MAN) mode of operation, **press** the **A/M** button on the keypad. The graphics display will have either A or M highlighted to show the selected mode.

2. In Manual, depressing Δ or ∇ controls the valve position. Valve position is monitored on the right hand bargraph display.

3. In Automatic, depressing Δ or ∇ controls the setpoint. The setpoint can be monitored on the left hand bargraph display.

4. To change the setpoint of LCV-1003 with the valve controller in Manual:

   a. **Select** the left-hand bargraph display by depressing **SEL** and observing the blue dot above the bargraph displays.

   b. **Depress** Δ or ∇ to control the setpoint. The bargraph will move up or down and the digital display will show the setpoint.

General Notes:

1. The new controller is a FOXBORO 760 series, microprocessor based, multi display system.

2. It has three "bargraph" LCD displays. From left they are:

   a. **Setpoint** - this shows the AUTO setpoint for RCDT level.
   b. **Variable** - this shows the actual RCDT level.
   c. **Demand** - this shows the demanded position of LCV-1003.

3. The digital display above the bargraphs gives a readout for whichever bargraph is currently selected.

4. The keypad on the lower section of the controller has eight buttons:

   Δ - to increase the selected variable.
   ∇ - to decrease the selected variable.
   W/P - not used
   R/L - not used
   A/M - selects Auto or Manual
   SEL - selects the function for the up/down buttons and the bargraph display which will have the digital display. Also used by I&C.
   TAG - used by I&C.

FARLEY NUCLEAR PLANT

UNIT 2

APPENDIX 2

FLOOR DRAIN TANK FILTER ISOLATION

Completed By _____ Date _____

Reviewed By _____ Date _____

This Appendix consists of 3 pages.

APPENDIX 2

FLOOR DRAIN TANK FILTER ISOLATION

NOTES:
1. This Appendix is only good for filter replacement on the shift it was performed.
2. Each step must be signed off immediately after completion of that step.

1.0 PURPOSE

1.1 To provide guidance for isolating the Floor Drain Tank Filter for filter element replacement.

2.0 VERIFY THE FOLLOWING (OR 1-98-498)

____ 2.1 The version of this procedure has been verified to be the current version. (OR 1-98-498)

____ 2.2 This procedure has been verified to be the correct procedure and unit for the task. (OR 1-98-498)

3.0 INITIAL CONDITIONS

____ 3.1 **Perform** this appendix when notified that Maintenance is ready to change the filter. This will prevent the filter from drying out.

4.0 PRECAUTION AND LIMITATIONS

4.1 This Appendix is only good for filter replacement on the shift it was performed.

5.0 **INSTRUCTIONS**

_____ 5.1 **Record** the work order number associated with the current filter replacement.

WO #_____

5.2 **Isolate** Floor Drain Tank Filter as follows:

_____ 5.2.1 **Verify** closed FLOOR DRN TANK FILTER OUTLET, Q2G21V189 (139' Floor Drain Tank Filter room)

_____ 5.2.2 **Close** FLOOR DRN TANK FILTER INLET, Q2G21V120. (139' Floor Drain Tank Filter room)

_____ 5.2.3 **Close** FLOOR DRN TANK DISCH TO WHT, Q2G21V123. (139' Floor Drain Tank Filter room)

_____ 5.2.4 **Close** FLOOR DRN TANK DISCH TO WASTE EVAP, Q2G21V267. (139' Floor Drain Tank Filter room)

_____ 5.2.5 **Open** FLOOR DRN TANK FILTER DRN, Q2G21V121A. (139' Floor Drain Tank Filter room)

_____ 5.2.6 **Open** FLOOR DRN TANK FILTER DRN, Q2G21V121B. (139' Floor Drain Tank Filter room)

_____ 5.2.7 **Open** FLOOR DRN TANK FILTER VENT, Q2G21V122. (139' Floor Drain Tank Filter room)

_____ 5.2.8 IF maintenance is (will be) delayed and work has not (will not be) started on the current shift, THEN **restore** the lineup to an inservice configuration starting at step 4.3.1, OR **have** the system configuration documented with a Tagout.

_____ 5.2.9 **Notify** SS that FDT filter has been replaced with the new o-ring and lid
MAINT torqued to 100 in-lb.

NOTE: IF the FDT filter was tagged in step 5.2.8 THEN the rest of this appendix is N/A.

5.3 WHEN maintenance has completed the filter replacement, THEN **return** the Floor Drain Tank Filter to service as follows:

____ 5.3.1 **Close** FLOOR DRN TANK FILTER VENT, Q2G21V122.
(139' Floor Drain Tank Filter room)

____ 5.3.2 **Close** FLOOR DRN TANK FILTER DRN, Q2G21V121B.
(139' Floor Drain Tank Filter room)

____ 5.3.3 **Close** FLOOR DRN TANK FILTER DRN, Q2G21V121A.
(139' Floor Drain Tank Filter room)

____ 5.3.4 **Open** FLOOR DRN TANK DISCH TO WASTE EVAP, Q2G21V267.
(139' Floor Drain Tank Filter room)

____ 5.3.5 **Verify** closed FLOOR DRN TANK DISCH TO WHT, Q2G21V123.
(139' Floor Drain Tank Filter room)

____ 5.3.6 **Open** FLOOR DRN TANK FILTER INLET, Q2G21V120.
(139' Floor Drain Tank Filter room)

____ 5.3.7 **Open** FLOOR DRN TANK FILTER OUTLET, Q2G21V189.
(139' Floor Drain Tank Filter room)

FARLEY NUCLEAR PLANT

UNIT 2

APPENDIX 3

FLOOR DRAIN TANK STRAINER ISOLATION

Completed By _____ Date _____

Reviewed By _____ Date _____

This Appendix consists of 2 pages

1.0 **PURPOSE**

1.1 To provide guidance for Floor Drain Tank Strainer basket cleaning or replacement.

2.0 **VERIFY THE FOLLOWING** (OR 1-98-498):

____ 2.1 The version of this procedure is the current version.

____ 2.2 This procedure is the correct unit for the task.

3.0 **INITIAL CONDITIONS**

____ 3.1 Floor Drain Tank Pump is tagged out.

4.0 **PROCEDURE STEPS**

____ 4.1 **Verify** Floor Drain Tank Pump has been tagged out with the following minimum electrical isolation:

- Pump hand switch N2G21P007-N LWPP H/S tagged in the pull-to-lock position.
- Motor 600V supply breaker FE-C5 open and tagged.

____ 4.2 **Verify** closed FLOOR DRN TANK STRAINER DISCH, N2G21V118.
(83' FDT pump room)

____ 4.3 **Close** FLOOR DRN TANK PUMP SUCT, Q2G21V131.
(83' FDT pump room)

____ 4.4 **Open** FLOOR DRN TANK STRAINER DRN, Q2G21V268.
(83' FDT pump room)

____ 4.5 **Open** FLOOR DRN TANK STRAINER VENT, Q2G21V132.
(83' FDT pump room)

4.6 WHEN the strainer has been drained, THEN **perform** the following:

____ 46.1 Slowly **loosen** and **remove** the four, ½" nuts holding the strainer cover in place.

____ 4.6.2 **Remove** strainer cover.

____ 4.6.3 **Remove** and **clean** the strainer basket.

____ 4.6.4 **Re-install** the strainer basket.

____ 4.6.5 **Inspect** strainer gasket for damage.

NOTE:	For a new strainer gasket use Red Rubber Gasket Material 1/8" Stock # 0000000014426.

____ 4.6.6 IF required, THEN **have** maintenance cut a new strainer gasket.

____ 4.6.7 **Re-install** strainer gasket and cover.

____ 4.6.8 **Replace** the four ½" nuts and tighten.

____ 4.7 **Close** FLOOR DRN TANK STRAINER VENT, Q2G21V132.

____ 4.8 **Close** FLOOR DRN TANK STRAINER DRN, Q2G21V268.

____ 4.9 **Verify** closed FLOOR DRN TANK STRAINER DISCH, N2G21V118.

____ 4.10 **Open** FLOOR DRN TANK PUMP SUCT, Q2G21V131.

____ 4.11 **Notify** SSS that strainer cleaning is complete, in order to have the removal section of the FDT pump tagout prepared.

FARLEY NUCLEAR PLANT

UNIT 2

APPENDIX 4

PROCESSING FDT USING TEMPORARY DEMIN LINER

Completed By_____ Date _____

Reviewed By_____ Date _____

This appendix consists of 6 pages.

PROCESSING FDT USING
TEMPORARY DEMIN LINER

1.0 PURPOSE

The purpose of this procedure Appendix is to allow processing of the FDT using a temporary demin liner discharging to the FDT or WHT.

2.0 VERIFY THE FOLLOWING (OR 1-98-498):

_____ 2.1 The version of this procedure is the current version.

_____ 2.2 This procedure is the correct unit for the task.

3.0 PRECAUTIONS AND LIMITATIONS

3.1 WHEN processed fluid is being routed to the FDT or WHT, THEN the appropriate tank level(s) should be monitored closely.

3.2 To extend the life of resin, temporary demineralizers should be isolated with water maintained in them when not in use.

3.3 IF any fire doors will be propped open due to hoses, THEN contact the Fire Protection Administrator to implement the appropriate compensatory measures.

4.0 INITIAL CONDITIONS

_____ 4.1 IF required to monitor floor drain tank level with a level hose and the hose has not been previously installed, THEN **perform** Appendix 5.

_____ 4.2 IF it is necessary to monitor and or determine the level of the floor drain tank with a level hose attached, THEN **follow** the guidance in step 4.5.1.3.

_____ 4.3 A temporary liner with resin is available to process the FDT per Figure 1.

_____ 4.4 **Arrange** with ENV to sample first pass of resin effluent, and **sample** the FDT to determine its ultimate destination (either FDT or WHT).

_____ 4.5 **Verify** that the liner is in place in an area that does not interfere with other work activities; **have** liner moved as necessary.

_____ 4.6 IF effluent is processed to the WHT, THEN adequate space is available to receive the volume of water processed.

_____ 4.7 **Set** up an empty, clean container to contain the first pass of resin effluent.

5.0 **INSTRUCTIONS**

_____ 5.1 **Notify** the Radside SO that a large amount of water will be transferred and additional level monitoring of the FDT or WHT will be necessary.

_____ 5.2 **Close** FLOOR DRN TANK FILTER INLET PI-1078 ISO, Q2G21V119A (2-LWP-V-7422A).

_____ 5.3 **Have** I&C remove flange to FDT FLTR INLET PI, N2G21PI1078.
I&C

_____ 5.4 **Have** I&C install flange with elbowed Chicago Fitting to flange in Step 4.3.
I&C

5.5 **Commence** processing the first pass of resin effluent by performing the following:

_____ 5.5.1 **Verify** closed FLOOR DRN TANK FILTER INLET, Q2G21V120 (2-LWP-V-7423).

_____ 5.5.2 **Verify** closed WMT PUMP DISCH TO FDT FILT, N2G21V356.

_____ 5.5.2 **Verify** closed FLOOR DRN TANK STRAINER DISCH, N2G21V118 (2-LWP-V-7421).

_____ 5.5.4 **Attach** ≈ 200’ of red rubber hose tested to 150# with banded Chicago fittings to the flange installed in step 4.4.

_____ 5.5.5 **Route** and **attach** hose to portable demineralizer.

_____ 5.5.6 **Route** discharge of portable demineralizer to empty clean container.

_____ 5.5.7 **Verify** open FLOOR DRN TANK FILTER INLET PI-1078 ISO, Q2G21V119A (2-LWP-V-7422A).

_____ 5.5.8 **Verify** open portable demineralizer inlet valve.

_____ 5.5.9 **Verify** open portable demineralizer outlet valve.

_____ 5.5.10 **Start** FLOOR DRAIN TANK PUMP, N2G21P007.

_____ 5.5.11 **Throttle** open FLOOR DRN TANK STRAINER DISCH, N2G21V118 (2-LWP-V-7421) to obtain desired flow rate through the portable demineralizer.

_____ ENV

5.6 **Sample** the first pass of resin effluent.

5.7 **Secure** the effluent flow by performing the following:

_____ 5.7.1 **Stop** FLOOR DRAIN TANK PUMP, N2G21P007.

_____ 5.7.2 **Close** the portable demineralizer inlet valve.

_____ 5.7.3 **Close** the portable demineralizer outlet valve.

5.8 **Determine** discharge path for processed effluent as follows:

_____ ENV

5.8.1 **Check** sample for visible chromates. IF visible chromates are present, THEN **recommend** replacement of the portable demineralizer resin, and repeat of steps 4.5 through 4.7.

Visible chromates present (circle one) YES / NO

_____ ENV

5.8.2 Based on sample activity level and chromate concentration results above, **circle** below the tank to receive the processed effluent. Signing for this step grants ENV permission to discharge portable demineralizer effluent to the tank designated below.

FDT / WHT

5.9 Processing to the WHT or FDT.

CAUTION:	Ensure the hose is adequately secured to prevent hose from becoming dislodged from the appropriate drain.

_____ 5.9.1 **Route** outlet hose from temporary demineralizer to the drain system for the tank designated in step 4.8.2. (i.e. floor drain for FDT or equipment drain for WHT)

_____ 5.9.2 **Open** portable demineralizer inlet valve.

_____ 5.9.3 **Open** portable demineralizer outlet valve.

_____ 5.9.2 **Start** FLOOR DRAIN TANK PUMP, N2G21P007 to initiate continuous processing of the FDT.

NOTE:	To monitor demin. effluent, place a white sheet of paper behind the effluent path for comparison to verify water is clear with no yellow tint.

____ 5.9.3 **Monitor** effluent frequently for CCW and secure if detected.

____ 5.9.4 WHEN processing is complete, THEN **stop** FLOOR DRAIN TANK PUMP, N2G21P007.

____ 5.9.5 **Close** the portable demineralizer inlet valve.

____ 5.9.6 **Close** the portable demineralizer outlet valve.

5.10 Restoration of process flowpath.

____ 5.10.1 **Close** FLOOR DRN TANK FILTER INLET PI-1078 ISO, Q2G21V119A (2-LWP-V-7422A).

CAUTION:	When disconnecting the 200' hose it could contain 8 – 10 gallons of water. Have a suitable container available to drain the contents of the hose. Have the drained water tested to ensure it contains no chromates prior to disposal.

____ 5.10.2 **Disconnect** the ≈ 200' hose from the installed flange and the portable demineralizer.

____ 5.10.3 **Have** I&C remove flange with elbowed Chicago Fitting
I&C installed in Step 4.4.

____ 5.10.4 **Have** I&C reinstall flange to N2G21PI1078, FLOOR DRAN
I&C TK FILTR INL.

__/__ 5.10.5 **Open** FLOOR DRN TANK FILTER INLET PI-1078 ISO,
CV Q2G21V119A (2-LWP-V-7422A).

__/__ 5.10.6 **Open**, FLOOR DRN TANK FILTER INLET, Q2G21V120
CV (2-LWP-V-7423).

____ 5.11 Independently **verify** the following:

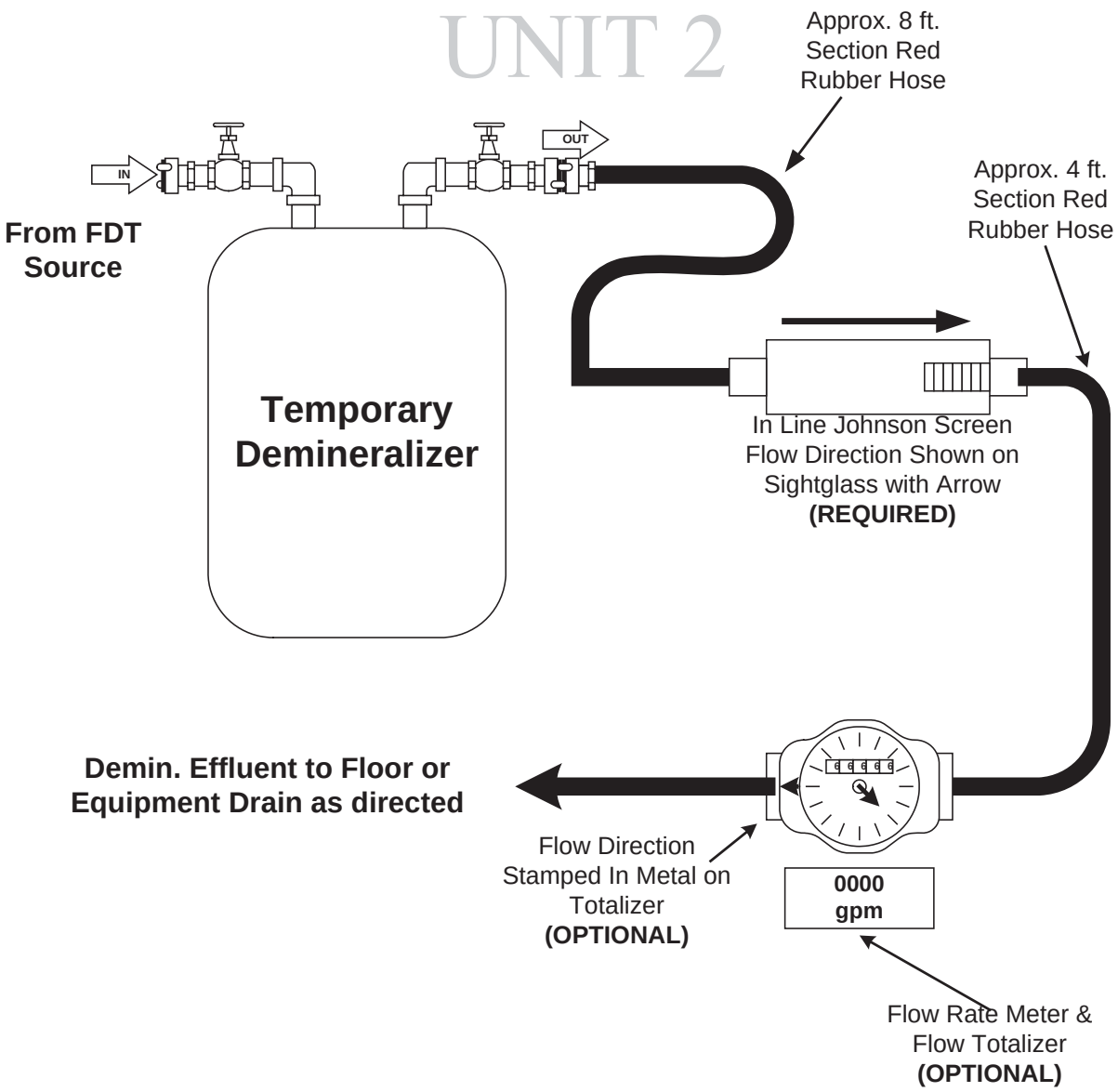
____ 5.11.1 **Verify** closed FLOOR DRN TANK STRAINER DISCH, N2G21V118 (2-LWP-V-7421).

____ 5.11.2 **Verify** open FLOOR DRN TANK FILTER INLET PI-1078 ISO, Q2G21V119A (2-LWP-V-7422A).

____ 5.11.3 **Verify** open FLOOR DRN TANK FILTER INLET, Q2G21V120 (2-LWP-V-7423).

____ 5.12 **Store** the hoses and elbowed flange in the appropriate location.

FIGURE 1



NOTE:
The in line Johnson Screen serves as an additional barrier to prevent putting resin into the floor drain system. The temporary demineralizer should not be placed in service without it. The flow indicator and totalizer are optional depending on the need to monitor flowrate and total gallons processed.

FARLEY NUCLEAR PLANT

UNIT 2

APPENDIX 5

INSTALLATION OF TEMPORARY LEVEL INDICATION FOR THE FLOOR DRAIN TANK

Completed By_____ Date _____

Reviewed By_____ Date _____

This appendix consists of 2 pages

1.0 PURPOSE

Provide guidance for the installation of a level hose to provide temporary level indication when the installed level transmitter is inoperable or for any other operational necessity.

2.0 INITIAL CONDITIONS

2.1 **Check** this appendix of this procedure for the following:

____ 2.1.1 The version of this appendix has been verified to be the current version. (OR 1-98-498)

____ 2.1.2 This appendix has been verified to be the correct unit for the task. (OR 1-98-498)

3.0 PRECAUTIONS AND LIMITATIONS

3.1 If a level hose has been installed on the floor drain tank it may be valved in for periodic monitoring whenever needed. However it must be valved out when the observation or monitoring is complete. Do NOT leave FDT DRN, Q2G21V130 open unattended.

4.0 INSTRUCTIONS

NOTE:	Only the appropriate section of this appendix needs to be completed. The other section may be signed off as N/A if not required to be performed.

4.1 LEVEL HOSE INSTALLATION:

____ 4.1.1 **Verify** closed FLOOR DRN TANK DRN, Q2G21V130.

____ 4.1.2 **Remove** the blind flange from the floor drain tank drain line.

____ 4.1.3 **Connect** a 2" reducer sized for the diameter tubing/tygon to be used for the level hose.

____ 4.1.4 **Connect** and route level hose.

NOTE:	Do NOT leave FDT DRN, Q2G21V130 open unattended.

____ 4.1.5 **Open** FLOOR DRN TANK DRN, Q2G21V130 as required to check level, THEN **close** Q2G21V130.

____ 4.1.6 **Repeat** step 4.1.5 as needed to monitor FDT level.

4.2 LEVEL HOSE REMOVAL:

____ 4.2.1 **Verify** closed FLOOR DRN TANK DRN, Q2G21V130.

NOTE: **Take** appropriate measures to contain any leakage from the level hose and drain line when performing the following steps.

____ 4.2.2 Carefully **disconnect** level hose and drain to an appropriate container.

____ 4.2.3 **Remove** the 2" reducer from the floor drain tank drain line.

____ 4.2.4 **Reinstall** the blind flange to floor drain tank drain line.

FARLEY NUCLEAR PLANT

UNIT 2

APPENDIX 6

WASTE EVAPORATOR FEED FILTER ISOLATION

Completed By _____ Date _____

Reviewed By _____ Date _____

This Appendix consists of 3 pages.

APPENDIX 6

WASTE EVAPORATOR FEED FILTER ISOLATION

NOTES:
1. This Appendix is only good for filter replacement on the shift it was performed.
2. Each step must be signed off immediately after completion of that step.

1.0 PURPOSE

1.1 To provide guidance for isolating the Waste Evaporator Feed Filter for filter element replacement.

2.0 VERIFY THE FOLLOWING (OR 1-98-498)

____ 2.1 The version of this procedure has been verified to be the current version. (OR 1-98-498)

____ 2.2 This procedure has been verified to be the correct procedure and unit for the task. (OR 1-98-498)

3.0 INITIAL CONDITIONS

____ 3.1 **Perform** this appendix when notified that Maintenance is ready to change the filter. This will prevent the filter from drying out.

4.0 PRECAUTION AND LIMITATIONS

4.1 This Appendix is only good for filter replacement on the shift it was performed.

5.0 **INSTRUCTIONS**

____ 5.1 **Record** the work order number associated with the current filter replacement.

WO #_____

5.2 **Isolate** Waste Evaporator Feed Filter as follows:

____ 5.2.1 **Verify closed** WEFF INLET, Q2G21V020.
(83' WEF Pump room)

____ 5.2.2 **Verify closed** WEFP DISCH TO FDT ISO, Q2G21V027.
(83' WEF Pump room)

____ 5.2.3 **Close** WASTE EVAP FEED FILTER OUTLET, Q2G21V019.
(139' Waste Evap Feed Filter room)

____ 5.2.4 O**pen** WASTE EVAP FEED FILTER DRN Q2G21V023A.
(139' Waste Evap Feed Filter room)

____ 5.2.6 O**pen** WASTE EVAP FEED FILTER DRN Q2G21V023B.
(139' Waste Evap Feed Filter room)

____ 5.2.7 O**pen** WASTE EVAP FEED FILTER vent Q2G21V022.
(139' Waste Evap Feed Filter room)

____ 5.2.8 IF maintenance is (will be) delayed and work has not (will not be) started on the current shift, THEN **restore** the lineup to an in service configuration starting at Step 5.3.1, OR **have** the system configuration documented with a Tagout.

____ 5.2.9 **Notify** SS that WEF filter has been replaced with new o-ring and lid
MAINT torqued to 100 in lb.

NOTE: IF the WEF filter was tagged in step 5.2.8 THEN the rest of this appendix is N/A.

5.3 WHEN maintenance has completed the filter replacement, THEN return the Waste Evaporator Feed Filter to service as follows:

____ 5.3.1 **Close** WASTE EVAP FEED FILTER vent Q2G21V022.
(139' Waste Evap Feed Filter room)

____ 5.3.2 **Close** WASTE EVAP FEED FILTER DRN Q2G21V023B.
(139' Waste Evap Feed Filter room)

____ 5.3.3 **Close** WASTE EVAP FEED FILTER DRN Q2G21V023A.
(139' Waste Evap Feed Filter room)

____ 5.3.4 **Open** WASTE EVAP FEED FILTER OUTLET, Q2G21V019.
(139' Waste Evap Feed Filter room)

____ 5.3.5 **Verify closed** WEFP DISCH TO FDT ISO, Q2G21V027.
(83' WEF Pump room)

____ 5.3.6 **Verify closed** WEF FILTER INLET, Q2G21V020.
(83' WEF Pump room)